

The Dock and Harbour Authority

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Editorial Comments

A Noteworthy Enterprise.

The interesting and important project for the construction of a graving dock of outstanding size at the Port of New York has already received notice in this Journal. Since the date, however, of the first announcement, at which time the location of the new dock was undecided, a site has been selected and the main outlines of the design determined. It seems appropriate, then, that publication should be made in this issue of the considerations which led to the inception of the scheme and of the gradual development of the final design. Through the courtesy of the Port of New York Authority, we are in the fortunate position of being able to reproduce in its entirety the Report on the matter which was issued in connection with the promulgation of the project. It is a full and detailed examination of all the relevant circumstances, and a lucid explanation of numerous conditions which had to be fulfilled in order to meet the imperative needs of naval and commercial expansion. As such, it is bound to be of interest to dock officials, and particularly to dock engineers, on this side of the Atlantic. No apology, therefore is needed for setting out the Report *in extenso*.

During the month of October last, Rear-Admiral Moreell reported to the United States House Appropriations Committee that a site at Bayonne in the State of New Jersey had been selected from among the eight locations provisionally submitted. This will involve the taking over of the Municipal Terminal at Bayonne, where the Navy Department proposes to establish a supply dépôt, which will be utilised in the construction of the new graving dock.

This particular site, it is stated in the Report, affords the unique feature of being easily protected from the mainland, in that a narrow causeway is the only means of access and connection with the Bayonne shore, a consideration of considerable importance in these days of world-wide hostilities with the possibility of attack from almost any quarter.

The proposed dimensions of the new dock have already been commented upon in our issue of August last. They are of considerable magnitude, and the dock, on completion, will rank among the largest of its kind. But, as may be gathered from our earlier comment, there is hardly justification for claiming for it, as has been done in certain quarters of the United States, the title of the "Largest Dry Dock in the World." We may readily admit that it comes within the class of "Super" dry docks, and that it will take a place in their foremost ranks, but, as we have pointed out, there are in various parts of the world, a number of graving docks with dimensions, some of which exceed, and others which are, at least, equal to, those adopted for the New York dock.

Having made this clear, we have no hesitation in hailing the project as a bold and arresting enterprise on the part of the Port of New York Authority, which will bring great credit to the leading port of the New World and prove of immense benefit both to the American mercantile marine and to the United States Navy.

The Growth of a Famous Port.

The historical development of the second port of the United Kingdom affords a study in port origins which will repay the serious enquirer, and our readers will be glad to have the opportunity of perusing the report of the lecture on the subject by Mr. J. Norman Benson which appears in this issue. Although not of foundation so ancient as London, Liverpool appears on the

scene of English history as far back as the thirteenth century, and the vicissitudes of its subsequent progress towards the proud position which it occupies to-day in British overseas commerce constitute a fascinating record.

Notwithstanding some local opinion to the contrary, it cannot, apparently, be maintained that Liverpool has a valid claim to the credit for the construction of the first impounded dock, but it runs London very close for this distinction and has kept a competitive pace with the metropolis ever since. The magnificent stretch of docks now existing along both banks of the Mersey Estuary is incontrovertible testimony to the enterprise and ability of the Mersey Docks and Harbour Board, which, since its constitution nearly a century ago, has administered the affairs of the port with conspicuous success. With a compact and populous hinterland in South Lancashire and the Northern Midlands, there is every prospect, after the termination of the present world tragedy, of continued progress to further heights of prosperity, by the leading exporting port of the country.

Port Controllers.

That things are not being too happily managed at the ports of the United Kingdom has been evident for some time past. The conditions, of course, vary and there is a difference in degree of the shortcomings in various localities, where, with, unfortunately, only too much justification, inefficiency is alleged to prevail. The comment on "Quayside Troubles" which was penned for our last issue showed unmistakably the considerable grounds which exist for criticism of the attitude of the workers and of the methods of those in control.

The recent appointment by the Minister of Transport of two Regional Port Directors for the North Western Region (ports between Holyhead and Silloth) and the Clyde Region (ports between Stranraer and Oban) respectively, emphasises the importance which the matter has now assumed. The duties of these officers, though obviously capable of being expressed, quite succinctly and accurately, as an obligation to "get a move on," are set out at greater length in official language. They are to secure the "most rapid clearance" of goods from the quayside, the "quickest turn-round" of ships and the "best utilisation of available transport facilities."

No fault is to be found with the terms of these instructions; they are sufficiently comprehensive to enable the most drastic steps to be taken in cutting Gordian knots and overcoming routine difficulties in which quayside operations appear to have become involved. The criticism which may most appropriately be made is to ask the questions: why has the step just taken been so long delayed and why have delay and congestion at ports been allowed to develop to such an extent that some sort of governmental interference has become inevitable?

It is a matter for conjecture how far the Minister of Transport has acted on his own volition, and how far under pressure of public opinion, since dissatisfaction with the present state of affairs has been widely expressed and specific action was taken, for example, by the Liverpool Chamber of Commerce in calling attention to the conditions at the Port of Liverpool.

Abundant evidence was forthcoming during the last war of the evils of port congestion, and its effect on the business life of the community, and there could be no more convincing object lesson than the chaos which then supervened. But it seems as if the British, living up to their reputation for "muddling through,"

Editorial Comments—continued

are incapable of benefiting from past experience. It was pointed out in the columns of this Journal, by competent authority, that the measures taken during the preliminary stages of the war were inadequate. It is to be hoped that the present tardy recognition of the fact will not prove too late for effective remedy.

Equally important as the supply of munitions, aeroplanes, guns and ships, is the expeditious handling of the ships themselves at the quayside. Delays to shipping in port have, of late, become so serious as to engage the attention of Parliament. The matter was raised in the recent debate in the House of Commons on production, supply and man-power. Lord Winterton referred to it as a "scandal." Mr. Shinwell, having put a specific case of delay to the Minister of Shipping, received the astonishing reply that the delay reported was "aggravated by the fact that the vessel carried a mixed cargo of steel and timber, including timber baulks of exceptional length, requiring special rolling stock which was not at the time available." Surely, an inept and unsatisfactory explanation! Why had not arrangements been made beforehand for the supply of the precise kind of rolling stock required? Where was the ship's manifest?

Redundant Form-filling.

Point is added to the foregoing comment by the New Year address of Sir Arthur Sutherland, President of the Newcastle Chamber of Commerce, in which he urged the Ministry of Shipping to press for the withdrawal of many "unnecessary" regulations in regard to the filling up of forms. He pointed out that delays might be reduced if every section concerned in the loading and discharging of cargo realised the vital need for despatch.

The Customs, he suggested, might be asked to relax a lot of their regulations, especially pre-entries. On the Tyne they had not been greatly troubled in this way, but in another northern port he had heard of a ship for which, he understood, 3,500 pre-entry forms in triplicate had had to be submitted. That had meant more than 10,000 forms for one ship's cargo. He hoped that the authorities in London would see that the trade was not hampered unnecessarily by the filling-in of forms.

A certain number of forms, of course, are requisite for the orderly and satisfactory transaction of business, but excessive "paper work" is not only waste of energy, but entails loss of precious time.

British Ports and the War Damage Bill.

The restoration and replacement of port structures and equipment, damaged or destroyed by enemy aerial attack, is a matter of grave concern to the port authorities affected, and some speculation may well have arisen, in connection with the Bill now being promoted by the Government to compensate owners of war-damaged property, as to the exact position in which port authorities stand in regard to claims for compensation.

We gather that public utility undertakings are, for the purpose of the Bill, to be the subject of further legislation, which, after consultation with the undertakings concerned, will be brought before Parliament. Provision will be made therein for the payment of contributions and the basis of compensation. In the interval, power is taken to provide the undertakings, by means of payments on account, with finance for urgent repairs of war damage.

Quayside equipment, such as cranes and operating plant generally, fall under Part II. of the Bill, which provides for the insurance of plant, machinery, equipment, etc., under a scheme called "the Business Scheme." At the moment of writing, the precise method of the application of the scheme is under discussion by the Board of Trade with the Ministry of Transport.

The Albert Canal.

On one of the closing days of last year, an inconspicuous voice over the German-controlled radio announced the opening to traffic on Christmas Day of the Albert Canal, named after Albert, late King of the Belgians. Bearing that distinguished name, it is sad to think, that an enterprise of such notable importance and so much promise for the development of commerce in Belgium should have fallen, even temporarily, into hostile hands and have been brought to completion by their means, or, at any rate, under their auspices. A little more than eighteen months ago, there was every prospect of the undertaking being put into commission by King Leopold, with the éclat that the occasion demanded, and in connection therewith a great Water Exhibition was being held at Liège during the summer months of 1939. Unfortunately, at the last moment, matters went awry. On June 26th of that year, almost on the eve of the commencement of the imposing ceremonial which had been planned, there was a sudden and disastrous collapse of the canal banks at Hasselt, involving the tragic death of several persons, including the engineer in charge of the works, so that any idea of proceeding with the inauguration ceremony during the period of the exhibition had to be abandoned. Then came the catastrophe of the present war, and within a short time the canal was the scene of intense fighting, during which several of its bridges and other ancillary installations were destroyed or damaged. Apparently, rehabilitation has now been effected.

Thus, at length, after a period of more than ten years absorbed in the execution of the scheme, which was authorised in 1927, the Belgian national aspiration to possess a waterway lying entirely within Belgian territory, which should connect the important industrial region round the City of Liège with the Scheldt and so with the open sea, has been realised. The Albert Canal is, in fact, an expression of Belgian sentiment in response to the challenge of the Juliana Canal in the Netherlands, though, until the usurping hordes have been cleared out of the two countries, no satisfaction can be felt by either in the development of its internal waterborne commerce. Indeed, it can only be bitterly distasteful to their inhabitants to see German purposes being served by, and German interests making use of, the praiseworthy undertakings which they had planned and executed with so much pride.

The Albert Canal is a notable addition to the great navigable waterways on the Continent of Europe. In length, it is close on one hundred miles, and it possesses six sets of locks for effecting changes of level, the capacity of the locks, as of the canal itself, being adapted to vessels of 2,000 tons deadweight. Five of the lockings negotiate a change of level of 33-ft. each, and the sixth, of just a little less than 19-ft., the total fall between Liège at the Port of Antwerp being about 184-ft.

Our readers will join us in hoping that the time is not far distant when the two canals will be restored to their rightful owners; and when this happy result has been attained, that they will alike share to an enhanced degree in the commerce of a regenerated Europe, not, be it said, in accordance with the "New Order" so blatantly proclaimed by the Axis Powers, but with one founded on the principles of liberty and good faith, for which this country and its allies are fighting with dogged determination.

American Tidal Lands.

A legal case of particular importance to port authorities in the United States, but not without interest to those in this country, is involved in a judgment given in a recent law suit in a Californian Court. The controversy arose over the ownership of certain submerged lands on the coast of California, which were valuable on account of their petroleum deposits. The Department of Justice has filed a decree in the United States District Court of Los Angeles expropriating 300 acres of such lands in the harbours of Los Angeles and Long Beach, claiming that the Federal Government has the right to take the lands without payment of compensation.

The matter had been raised previously in Congress when a resolution, proposed by Senator Nye, calling on the Attorney General to "assert, ascertain, establish and maintain" the national rights and interests in submerged lands under territorial waters, was checked by a counter resolution for the appointment of a Committee to investigate the whole subject, since the Supreme Court had held that the title to such lands lay with the respective sovereign states.

The issue at stake is of great importance in view of the considerable investment of capital which has been made by the City of New York and others in the reclamation of tidal lands for the construction of piers, wharves, warehouses and other port structures. It is estimated that property valued at many million dollars in New York Harbour alone, will be affected by the result of this conflict of opinion between the Californian Court and the Supreme Judicature.

Naturally, the matter has attracted the attention of the American Association of Port Authorities, and at their recent Convention at Long Beach, California, a Paper on the subject of the ownership of tidal lands was read by Mr. W. Reginald Jones, Assistant Port Attorney of Oakland, Calif., following which, Mr. Chas Beardsley, Port Attorney of Oakland, and Mr. Jones were authorised to appear on behalf of the Association at the legal proceedings.

Nauru.

Nauru, which, as announced in the Australian Parliament, the Germans, under cover of the treacherous use of the Japanese flag, have recently shelled, is a lonely island in the Central Pacific, remote from the normal routes of navigation. It is about 500 miles N.N.E. of the Solomon Islands and 2,000 miles from Sydney. In size it is insignificant, its area being only 5,400 acres—a little over 8 square miles.

The importance of the island lies in its rich deposits of phosphates. The terrain is of raised altered coral formation, an upper thick layer of which has been phosphatised by the action of the weather and sea-water on vast quantities of guano. These phosphates are valuable fertilisers and their extraction and export has been much facilitated by a large, up-to-date installation of conveying and ship-loading plant, which was described at length in an article in the October, 1937, issue of this Journal. The installation is now, presumably, in ruins, furnishing further evidence of German destructive proclivities. No doubt it will be claimed by the Nazis that the island has "military value" as a source of fertilisers for British crops! The argument is unconvincing since supplies have been open to the world.

Proposed Large Dry Dock at the Port of New York

Report on the Proposal by the Port of New York Authority

PURPOSE OF REPORT.

THIS report is concerned with the need for, and the desirability and practicability of constructing a dry dock in the Port of New York District of sufficient size to accommodate the largest naval and mercantile vessels.

Under the Compact of April 30th, 1921, between the States of New York and New Jersey creating The Port of New York Authority, it is authorised, as an item in the plan for the development of the port, to "purchase, construct, lease and/or operate" such docks, dry docks and other port facilities as may be requisite to the port's improvement, providing such facilities can be constructed on a self-liquidating basis.

In 1928, the Legislature of the State of New Jersey further directed the Port Authority to report on the need, cost and suitable location of a dry dock in the Port of New York of sufficient size to accommodate the largest ocean steamships. On February 20th, 1928, after study and a public hearing the Commissioners of the Port Authority transmitted such a report to the New Jersey Legislature. That report concluded that, as a matter of national port policy, New York should have a dry dock capable of accommodating the largest vessels entering the port. It recognised, however, that the volume of commercial business which a dock of such size would attract, appeared insufficient to make it financially self-sustaining. The 1928 report, therefore, took the position, just as the Port Authority does to-day, that such a project was essentially a public facility which could not be provided solely by private enterprise but which was nevertheless needed as a matter of national protection and adequate port development. It therefore concluded that such a dock could be financed only with the aid of public funds. (A copy of the summary of conclusions reached by the 1928 report is included in an Appendix).

From time to time, since 1928, the continued need for such a dry dock in this port has come to public attention. During the last session of the present Congress, the Chairman of the House Naval Affairs Committee, Mr. Vinson, introduced a bill which would have authorised the Secretary of the Navy to solicit proposals from private corporations for the construction of such a dock. Under the provisions of this bill the Secretary would have been authorised to accept a satisfactory proposal and to submit to Congress an estimate for an appropriation not to exceed \$3,500,000 as a federal grant in aid of such a project. In furtherance of its duties to co-operate and assist in all matters of port development the Port Authority was deeply interested in this proposed legislation and sent its representative to appear in its support before the House Naval Affairs Committee. The project was reported on favourably by the Senate Committee but was not reported out in the House. During the course of the hearings several of the Committee members had taken objection to the bill on the ground that it involved a federal grant to a private corporation.

The Commissioners of the Port Authority have recently been giving such a project further consideration and are of opinion that during the past year new developments have re-emphasised the need for such a dock. They believe that a programme of federal, state and private co-operation might be worked out which would enable the Port Authority to go forward with the dock's construction, and that through the Port Authority the efforts of all interests concerned—the Navy Department, the States of New York and New Jersey, and the private shipbuilding and repair companies—could be united in the successful completion and operation of such a project.

Conferences were therefore held with the Secretary of the Navy, the Assistant Secretary and the Chief of the Bureau of Yards and Docks, and with the Chairman of the United States Maritime Commission. During the course of these conferences it became clear that the Navy Department and the Maritime Commission considered this project one of primary importance. They encouraged the Port Authority to go forward with the preparation of this report.

For purposes of port development, the States of New York and New Jersey have conferred upon the Port Authority all governmental powers and immunities appropriate to that task, "except the power to levy taxes or assessments." The Port Authority's public projects must therefore pay for themselves out of their own revenues. This is the "authority plan." It has been successfully employed over the period of the past twenty years in the Port Authority's programme of port development, including its construction of bridges, tunnels and terminals in the port area. In the present instance the participation of the Port Authority would co-ordinate the governmental powers and immunities of the two States with the efforts of the Federal Government in a

joint attempt to make the project economically practicable. In other words, with a sufficient federal grant in aid, the remainder of the construction cost might be financed on a self-supporting basis. If after further study and negotiations, such a programme proved feasible, the Port Authority would undertake the construction of the dry dock, on the basis of private operation, through long term lease of the facility at a rental sufficient to service the bonds issued for its construction.

As we have noted, this new approach to the problem has met with the encouragement and approval of the Navy Department. The purpose of the present inquiry and report is to develop the possibilities of such a co-operative programme to the point where the Navy Department might recommend Executive and Congressional action. On the basis of such legislation as might then result, detailed engineering and financial studies could be completed and negotiations undertaken with the ship repair or shipbuilding companies looking to the long term operation of the facility. If these studies and negotiations proved successful a definite proposal would then finally be submitted to the Secretary of the Navy upon the basis of which construction could go forward.

Accordingly, the Commissioners retained Frederic R. Harris, Inc., outstanding engineering experts in the field of dry dock construction, as consultants in the present studies. This report is based largely upon their findings.

Preliminary conferences have also been had with some of the leading private ship repair and shipbuilding companies in the port area. While there is common agreement that a project of this size and character could not be privately financed, all of these companies recognised the high desirability of having such a facility at the Port of New York and were deeply interested in the possibilities of its operation. It was apparent, however, that such operation was not economically practicable unless the initial construction subsidy was such as to bring the annual rental within reach of such revenues as might reasonably be anticipated.

NEED AND DESIRABILITY.

The Port of New York is not only the greatest port in the United States but is the greatest port in the world. Its importance is not confined to the municipalities of the metropolitan district, nor to the two states within whose borders the port is located. It is the largest, richest and most populous port of what is perhaps the largest, richest and most populous coastline in the entire world—the great industrial east coast of America. Its railroads, highways, rivers, bridges, tunnels, industrial plants and all the myriad of accessory developments—private, municipal, state and national—are the essential machinery of our national welfare and defence. All of these improvements are, however, merely ancillary to the thousands of ships that make the harbour of New York their American terminus. The facilities for the handling of those ships and for their convenience and protection are therefore a fundamental factor to be considered in the development of the port and the continuance of port prosperity.

The maintenance of adequate ship repair facilities is of the very essence of port efficiency. Dry dock and ship repair facilities are the service stations of shipping. They are essential to the safe and continued operation of ships. With the construction of larger and larger vessels it has become necessary to expand the size of these facilities. Yet the only great terminal port in the world that lacks a dry dock of sufficient size to accommodate the largest liners is the Port of New York. Graving docks that can accommodate such ships are available at Boston, Philadelphia and Norfolk—though channel limitations at Philadelphia would make it impossible to use this dock for the larger ships.

The largest transatlantic ships are normally dry docked about twice a year, once for general inspection and hull painting and once during their annual overhaul. The average time in occupancy of the dock obviously depends upon the amount of work to be done. In the case of the routine inspection and hull painting the period in dry dock may be only a few days. The annual overhaul generally involves a period of several weeks out of service, of which only the last week or more will be taken up with dry-docking.

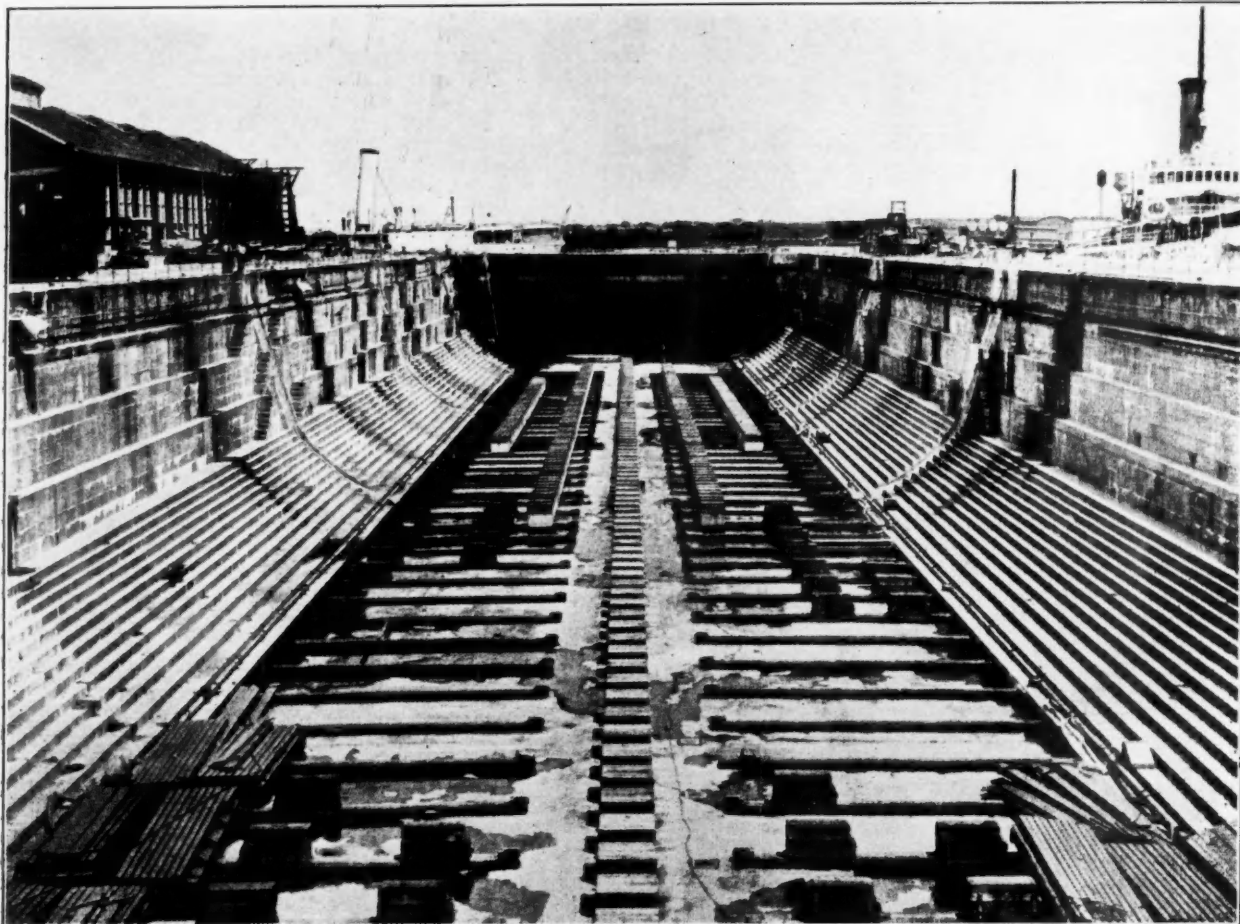
The Port of New York has adequate repair plants and dry docks to handle all but the largest merchant and naval vessels. These facilities are splendidly equipped and have available a highly-skilled personnel that is the technical equal of any in the world. The companies which operate these plants have from time to time added to their facilities so that to-day they are fully competent to handle ships somewhat over 700-ft. in length. This maximum capacity is available in the largest dock at the Todd Shipyards Corporation in Erie Basin, Brooklyn. The largest floating dry dock is that of the Bethlehem Steel Company at their 56th Street

Proposed Large Dry Dock at the Port of New York—continued

plant in Brooklyn, which can accommodate vessels about 700-ft. in length. The Brooklyn Navy Yard has a graving dock with a usable clear length of 727-ft. However, this dock is available only when not needed for docking naval ships and when commercial facilities are not available.

The private ship repair companies provide the Port of New York with a number of smaller dry docks sufficient at all times to accommodate the tremendous fleet of merchant ships which operate in and out of the port.

35,000 ton battleship which will be launched there next month. This dock cannot be increased in size sufficiently to dock the 45,000 ton battleships, and there is no site available either in the yard or any of the properties adjoining it where a dock could be constructed even approximating the dimensions specified for the new dry docks now under construction at Puget Sound and at Pearl Harbour, Hawaii. Furthermore, the difficulty of channel approach for ships of maximum size and the hazard of the East River bridges would, in any event, preclude the construction of



Typical Graving Dry Dock and Caisson.

Naval Need

Last year, as a part of its shipbuilding programme, the Navy Department urged the necessity for the construction of a large dry dock somewhere in the Port of New York District, if the New York Navy Yard was to continue its primary mission as a building yard for the larger naval vessels. The New York yard is located within a densely populated area of the City where an unlimited supply of skilled and technical workers is available and where materials, supplies and appliances can be readily obtained. At the present time, the New York Yard employs about 11,000 workers. It is, therefore, one of the most advantageous locations for naval construction work, particularly in the heavier categories. The provision in this area of a dry dock capable of docking the 45,000-ton class of battleships is therefore of major importance.

From the standpoint of national defence, there would seem to be a primary need for a large dry dock at this port, which would be deep enough to take a battleship in a damaged condition; large enough to accommodate the so-called "ultimate" battleship; long enough to dock the largest commercial vessel of any nationality, built or projected; and capable of extension to provide a usable length equal to that of the new Panama Canal locks.

There are now three large dry docks on the Atlantic Coast, at Boston, Norfolk and Philadelphia. The docks at Norfolk and Philadelphia are practically of the same dimensions as the existing Panama Canal locks and are Navy dry docks located in Navy yards. The dry dock in Boston is now owned and operated by the Navy. This latter dock is considerably larger than the docks at Norfolk and Philadelphia. Its dimensions were largely fixed by the foreign steamship owners who, at the time of its design and construction, had encouraged the State of Massachusetts to proceed with this work.

The largest dock at the New York Navy Yard is Dry Dock No. 4, which was constructed about thirty years ago. With the extension recently completed, it is large enough to dock the

such a dock at the New York Yard, even if a suitable site were available. The Navy Department has therefore determined, as a fundamental consideration, that the dry dock in question must be located below the suspension bridges.

The Navy Department selected the Navy Yards at New York and Philadelphia for the construction of the two 45,000 ton battleships which have already been authorized. Of the three battleship building yards, New York, Philadelphia and Norfolk, the latter two have large dry docks capable of docking these 45,000 ton ships after launching in case emergency docking should be required. As we have heretofore noted, there is no dry dock in the New York area which can take one of these ships. As a matter of fact, there are only two docks, those at Boston and Norfolk, which could dock such a ship in a damaged condition. The channel to the Philadelphia dock limits the draft of the ship. A battleship in a damaged condition could also be docked at Panama. However, there are no docks on the Atlantic Coast, or at Panama, which meet the requirements of the Navy for its ultimate battleship. Such dimensions, as we have noted, are available only in Puget Sound and at Pearl Harbour, where the Navy Department has fixed the dimensions as follows: length 1,000-ft.; width at top of keel blocks 132-ft.; depth over sill 45-ft. The above width and the depth at mean high water have been adopted for the New York dock which is recommended in this report. Here the usable length has been made 1,100-ft. to accommodate possible commercial ships of the immediate future, with provision for lengthening to 1,200-ft., the length of the new Panama Canal locks.

It will be understood that the Navy's interest in the construction of such a dock at New York is primarily for its availability as a protective or emergency facility. The American Fleet spends most of its time in the Pacific and, except in time of war, the Navy's use would be infrequent. In all likelihood, the Navy Department would only call for the use of the dock for the service of newly-launched battleships and for the aircraft carriers, "Saratoga" and "Lexington," neither of which can be

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accommodated in Dock No. 4 at the New York Yard.¹ The Navy Department has also indicated that it prefers such a dry dock to be constructed by a public agency other than the Navy, with the Federal Government participating by direct grant. This would result in lower initial cost to the government, would obviate maintenance cost, would reduce operating charges to a minimum, and would relieve the government of the necessity of providing the shop facilities which are a necessary accessory to any dock.

Commercial Desirability

There are eleven liners which, in times of peace, make New York their American terminus, and which cannot be accommodated in any private dry dock in the New York area. They are:

Registry	Name of Vessel	Gross Tonnage	Load Draft ft. in.	Overall Length
Great Britain	Queen Mary	81,235	38 10	1,018.00
	Aquitania	45,647	36 2	901.00
	Queen Elizabeth	85,000	—	1,030.00
Germany	Mauretania	35,739	30 9	772.00
	Europa	49,746	33 8	937.6
France	Bremen	51,731	33 10 1/2	938.7
	Normandie	83,423	36 7	1,029.1
Italy	Ile de France	43,450	34 7	792.5
	Rex	51,062	33 1	879.75
America	Conte di Savoia	48,502	31 2	814.5
	America	30,000	32 3	723.00

because heavy additional expense is involved, both in operating charges and loss of time, in journeying to and from a port other than their usual terminal port for dry docking purposes, and finally because of the large pool of highly skilled marine workers available in this port.

When the United States Lines were operating the "Leviathan," "George Washington," and the old "America" out of the Port of New York without a dry dock in this area of sufficient size to handle them, they estimated that these three ships alone required the use of such a dock for thirty days each year for routine examinations and repairs. This estimate did not include any estimate of additional time that might be anticipated in the event of accident or any other mishap. In addition, each of these vessels lost about two weeks' service time in each year through the necessity of travelling back and forth to dry docks at other Atlantic ports, one of which weeks was in the summer time and resulted in serious operating loss. At that time, the representatives of the United States Lines estimated that "they could allow \$100,000 a year for the use of that dock, in addition to the cost of docking their vessels, and be money in pocket." (Minutes of the public hearing held by the Port Authority on February 6th, 1928, page 194).

The use of such a dock will not be limited only to those vessels which cannot now be accommodated at the port. The dock would be constructed with a caisson or intermediate seat which

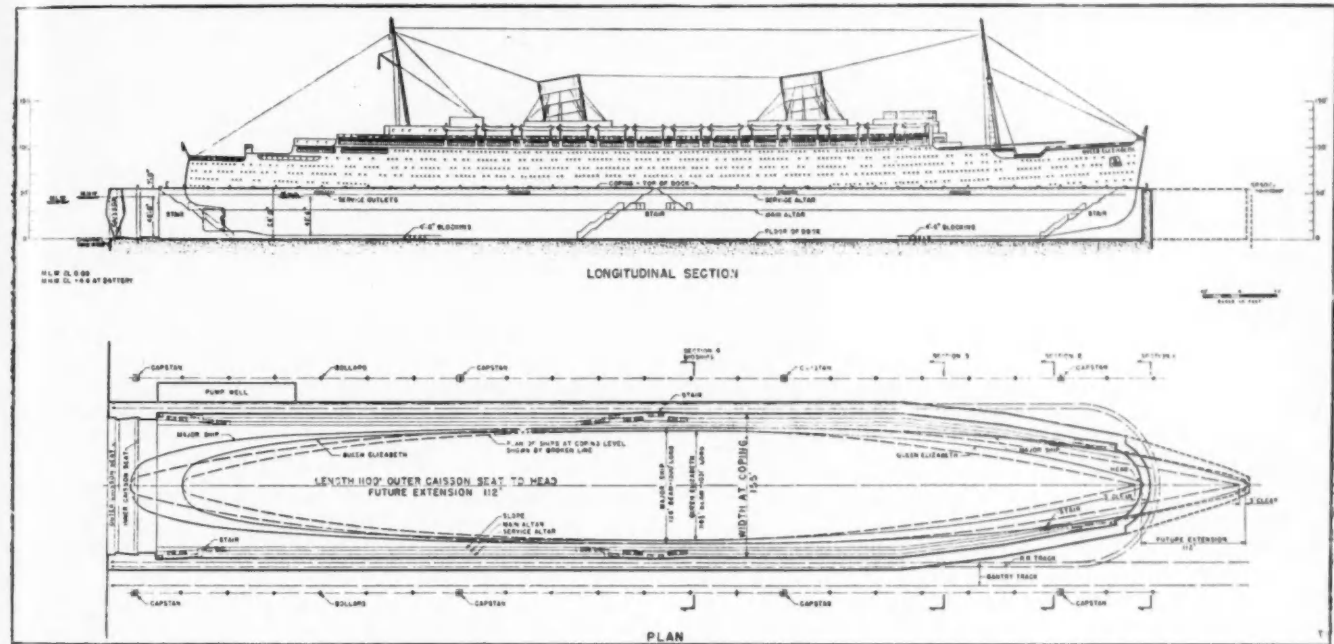


Fig. 1. Plan of Dock and Longitudinal Section.

The "America" can be docked at the Brooklyn Navy Yard but, as has been noted, the Navy Yard dock is available only when not needed for the docking of naval ships and when commercial facilities are not available.

With the European War now waging, only two of these ships, the "Conte di Savoia" and the "Rex" are in commercial operation, and the conditions which will obtain after the war are, of course, impossible to forecast. The "America" will be put in service in June, 1940. At least two additional ships of the "America" class are in plan at the Maritime Commission for the South American trade. They foreshadow a projected development of the North and South American inter-Continental trade, which already is in the forefront of informed American political and mercantile thinking. The distances to be covered in the handling of such trade and the necessity for speed, would seem to point inevitably to further construction of the super-liners for this inter-Continental run.

However, the history of merchant shipping would seem to leave little doubt but that, with the conclusion of the war, the world's fleet of large transatlantic liners will again be crowding the Port of New York. As a large dry dock would require at least three years to construct, it is reasonable to hope that by the time it was completed normal port commerce would again be proceeding on a somewhat similar scale to that obtaining before the war.

All of the large American vessels which are constructed for Atlantic service will inevitably use the Port of New York, and if a large dry dock were available here they would use that dock. They will use it because American ships are subject to a 50 per cent. tariff penalty on any ship repair work performed abroad,

¹Generally speaking, this is an element of commercial advantage rather than otherwise, for any extensive use of the dock in peace time by naval ships at naval rates might seriously curtail the opportunities for the more profitable mercantile repairs.

would permit its operation in two sections, and so make its use economical for the numerous other large vessels using the port which can now be accommodated only in the largest docks on the Brooklyn shore. Both of these docks, the floating dock of the Bethlehem Company and the graving dock of the Todd Company, are frequently operated at full capacity, and there would seem to be good reason to believe that there might be frequent and advantageous use of one or both halves of the contemplated "super-dock" for the accommodation of vessels up to 700 or 800-ft. in length.

In any forecast as to the commercial use that might be made of a dock of this size, no reliance can be placed upon any routine use of the dock by the larger foreign flag vessels. All of the European ports from which they operate are equipped with dry docks of sufficient size to handle their largest ships. Incidentally, it is interesting to note that their ports are equipped with these facilities irrespective of their direct financial return, and simply on the basis of fundamental considerations of their national defence, public welfare and essential port equipment.

For routine inspection and overhauling, and wherever possible even in the case of emergency repairs, these foreign flag vessels will dry dock at their home ports. They would do so in any event as a matter of their own national policy, for both the lines and the dry docks are so heavily subsidised by their governments as to be in all practical effect a national merchant marine. Aside from this, however, these vessels will naturally dry dock at their home ports because labour costs there are approximately one-half of those obtaining here, and because in their home ports it is possible to lay off the crews during the period of repairs.

This does not mean, however, that the foreign steamship companies are not concerned with the absence of a dock in the Port of New York. On the contrary, both the steamship companies, and particularly the marine underwriters, have always regarded the absence of such a facility here as a worrisome situation and

Proposed Large Dry Dock at the Port of New York—continued

as one of the few disadvantages of the port. These vessels will, of course, continue to operate into New York as their American base even under the handicap of the absence of a dry dock in New York. Still they do so with additional risk that could have serious consequences both to themselves and to their underwriters, and which might be a blow to the prestige of the Port of New York in the event of any serious mishap. There have been occasions when large foreign flag steamers have been forced to return to their home ports abroad with one propeller disabled because there was no dry dock that could handle the ship at New York. Again, if any of these ships should encounter a major accident requiring dry docking when in the vicinity of New York, it would be necessary to take the ship to Boston in her disabled condition; an operation of the greatest danger and risk and one which, even if safely carried out, would involve a heavy expenditure.

With the complete disruption of all European shipping operations except the Italian, it is impossible to-day even to explore the possibilities of obtaining any commitments as to either minimum annual use or annual subsidies from the foreign steamship lines

From the aspect, therefore, of commercial desirability, of port obligation and prestige, of the requirements of an expanding American merchant marine, and of the protection of the great foreign ships that make this port their American port of call, there can be no question about the need for such a dry dock. This is not to say that it could entirely pay its way as a commercial proposition. Everyone is in agreement that it could not do so. For a large part of its "dividends," we must look to its broad value to the port district, to the states and to the nation. We must look to it as one of the vital requirements of the proper development and protection of the Port of New York. It is these public benefits of national mercantile interest that justify the construction of such a dock as a public project, to be subsidised by the public, to the extent that it is unable to carry itself commercially. A substantial federal grant in aid would, in all probability, make it possible for the Port Authority to finance the remainder of the cost on a self-liquidating basis. Thus, through the medium of the Port Authority, private initiative would operate the dock, and make available a return sufficient to defray a large portion of its cost.

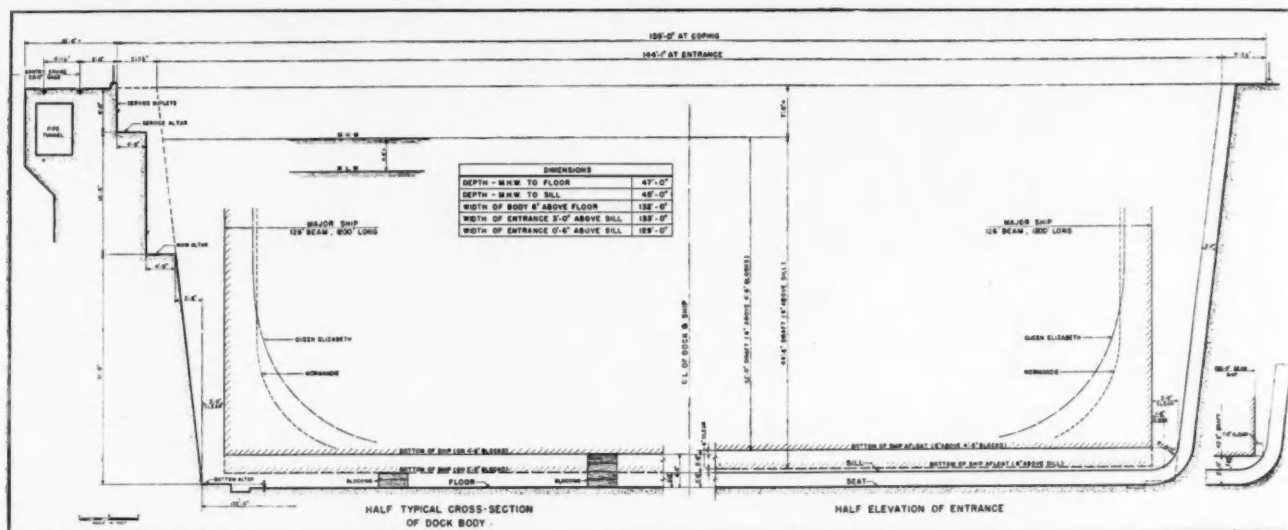


Fig. 2. Typical Cross Section and Entrance Elevation

toward the maintenance of such a facility. These possibilities have, however, been canvassed in the past, and it is possible that some minor guaranteed income might be obtained in this way in normal times.¹

Finally, there would undoubtedly be times when, in spite of the additional American cost, the exigencies of meeting scheduled sailings would make it worth while for the large foreign vessels to use a dry dock available here. And there might be many instances in which the marine underwriters would insist upon dry dock examination before the issuance of a certificate of seaworthiness if there was a dry dock at New York. In such situations, foreign vessels are now usually able to obtain such certificates and to return to their home ports because of the impossibility of dry dock examination here.

In reviewing the desirability of a large New York dry dock, we assume that the super-liner is here to stay, and that in the future there will be more of them and larger ones. The history of shipping indicates that with human progress and the advances in science and the arts, there is a tendency for ships to increase in size rather than become smaller. Frequently, this tendency may have become over-emphasised. The ambition of the ship builder has sometimes outstripped the practical requirements of the particular time. This may have been true, for instance, at the time of the construction of the "Great Eastern," and more recently in the cases of the "Leviathan" and the "Majestic." In both these periods, there were many critics who were outspoken in their opinion that there was no warrant for the design and construction of ships of their size, and with their commercial failure ship owners and naval architects of those days were convinced that the future of ship building would be confined to smaller ships.

In each case, the prophets have proven to be wrong. The "Great Eastern" was dwarfed by its successors. The "Leviathan" and "Majestic" in turn, were outstripped by the "Normandie," the "Queen Mary" and the "Queen Elizabeth."²

¹In the Port Authority's 1928 Report, the conclusion was reached that at that time several of the foreign lines might be willing to contribute to the maintenance of a subsidy to assure having such a facility available in this port in an emergency, and during the course of the hearing, several of the representatives of the foreign lines indicated such a possibility. Prior to the first World War, such an arrangement was actually worked out in connection with the Boston dry dock, which provided for the maintenance of an annual subsidy by four of the foreign lines.

METHOD OF CONSTRUCTION AND OPERATION.

In any consideration of the construction of such a dry dock at the Port of New York, we are faced with the fact that, as a matter of unaided private initiative, it is not economically practicable. From the standpoint of direct return on private investment, it could only hope to support a part of the cost. This is so because of a combination of factors at New York that are readily apparent. High real estate costs for waterfront property and, as to some of the desirable sites, either high foundation costs or expensive channel requirements, result in an initial investment about 100 per cent. in excess of the capitalisation of anticipated dry dock revenues.

At the outset, therefore, we are faced with the fact that the project cannot be considered except on the basis of a public subsidy of at least half the total initial cost. Even on such a basis, it may be difficult for the private operator to estimate a return sufficient to carry the amortization and interest charges on the remaining half of the initial investment, cover his maintenance and operating charges and, in addition, foresee the possibility of some reasonable return.

Yet, the project is of major importance to the Navy, and highly desirable from the standpoint of our foreign trade and the continued development of the port area. At the same time, the project is one that, in its very nature, can best be operated, and can provide the most efficient service, if carried on by a well-established private ship repair company. The problem then is to synthesise all of these interests and to find a basis of public construction and private operation that will reach the objective, and do it with fairness to both the public and the private interests involved.

It is recommended that the problem be met first by a federal grant in aid to the extent of one-half of the initial cost of the entire dry dock project. As to the second problem, of how even this remaining half of the initial cost can be provided for, we believe that the governmental powers of the two States, as exercised through the Port Authority, can be of service in bringing

²Even to-day, there is a tendency to consider these large foreign flag ships as not commercially justified and as merely expensive gestures of national pride. For a rather convincing challenge to this viewpoint, see "American Super Liners—They will Pay!" by Mr. George C. Gade of the American Export Lines, Proceedings of the Society of Naval Architects and Marine Engineers, November, 1939. Note, also, the construction of the new America and the plans of the United States Maritime Commission for other large American liners.

Proposed Large Dry Dock at the Port of New York—continued

the interest and operating charges within the range of such revenues as can be reasonably anticipated. On such a basis, it is our opinion that the facility could be rented to a private ship repair company or companies on the basis of a long term lease that would yield a rental sufficient to retire the bonds, meet interest charges, and cover such additional charges as may be incidental thereto.

The approach taken by the bill introduced at the last Session of Congress, recognized certain of these fundamental considerations. It recognized the necessity and desirability of the dock, the impossibility of its construction entirely on a privately financed self-supporting basis, the desirability of its operation by private ship repair interests, and the consequent necessity for some federal subsidy toward its construction.

Generally speaking, we find that the proposals embodied in the 1939 bill only went half as far as may ultimately be necessary if its purpose is to be accomplished. Our cost studies indicate that it will be necessary to increase the amount of the grant in aid up to half the final cost of the project to as much as \$7,000,000. We conclude, also, that even on that basis, the dock can only be put into operation with the further assistance of those powers and immunities of the two States with which the Port Authority is entrusted. These include the Port Authority's power of eminent domain, its power to issue tax exempt securities and its immunities from state and municipal taxation. With the federal grant in aid and with the interposition of these state advantages, it is believed that it will be possible for private ship repair interests to make a commitment as to annual rental that will enable the Port Authority to finance and construct the dock on a self-liquidating basis.

As we have noted, the Authority Plan as developed, particularly by the States of New York and New Jersey in their creation of the Port Authority, contemplates the construction and operation of great public works on a self-liquidating basis. The two States invested the Port Authority with all appropriate governmental powers and immunities except the power to levy taxes and assessments. It is thus, in effect, a bi-state financing, constructing and operating agency, developing the Port of New York entirely on the basis of such tolls, charges and other revenues as may be returned from the use of the projects themselves.

The possible revenue from a large dry dock of this type falls far short of the amount that would be required to support the initial cost. We therefore approach the problem with a consideration of what proportion of the cost those revenues could support, and we recommend that the policy of self-liquidation be followed to that extent.

The principle of the grant in aid is not new to self-liquidating projects of this type. Advances were made by the two States in the case of Port Authority bridges and minor grants in aid by the Federal government were contributed to the Lincoln Tunnel project.

That portion of the construction cost which would remain for Port Authority financing would be raised by the sale of Port Authority bonds constituting a first lien on the dry dock rentals and supported also by the general faith and credit of the Port Authority. The permanency of the dry dock structure is such that these bonds could run to long maturities. The bonds would be tax exempt; with the aid of legislation they could be made legal for the investment of trust funds, and it is estimated that they might be marketed at a rate as low as 3%.

As we have heretofore pointed out, we consider it essential that such a dock be operated by private ship repair interests. Every consideration of plant organization, technical skill, and the nature of the ship repair business, compels the conclusion that the operation of such a dock should be in the hands of private enterprise. Our conferences with the representatives of some of the leading private ship repair companies in the Port District have convinced us of their deep interest in the operation of such a dock and of their willingness to undertake it, provided that a rental can be worked out that is reasonably commensurate with possible revenues. These companies were: the Bethlehem Steel Company, Federal Shipbuilding and Dry Dock Company, and the Todd Shipyards Corporation. Their operation would be on the basis of a long term lease.

The lease would require the ship repair company to maintain the dry dock at all times in first-class operating condition, not alone for their own business but for such use as the Navy Department would require.

A dry dock is of very little use unless it has available the plant and facilities of a complete ship repair plant. In the case of a dock of the size of this one, there could in fact be no economical operation unless it was constructed as a part of a completely equipped ship repair plant, including, also, a sufficient number of smaller dry docks. It is not our recommendation that such a yard and plant should be provided as a part of this project. The minimum facilities necessary to the operation of the large dock and which are included as a part of our construction plan will be indicated hereinafter in the section on Design and Plan. It is rather our thought that the complete ship repair plant, other than the large dry dock itself and its immediate accessories, should

be provided by the repair company. This could be done either by the construction of the dock at a site adjoining one of the existing plants, or by the construction or reassembly of such a plant at a new site. In the latter case, the lease would include an ample area for the construction or reassembly of such a new ship repair plant.

These alternative methods of procedure will, of course, have a considerable bearing upon the rental which the operator can afford to pay. Thus he might be able to make a commitment for a higher rental of a dock adjoining his existing plant than he could contemplate if he were faced with the reassembly of his plant at

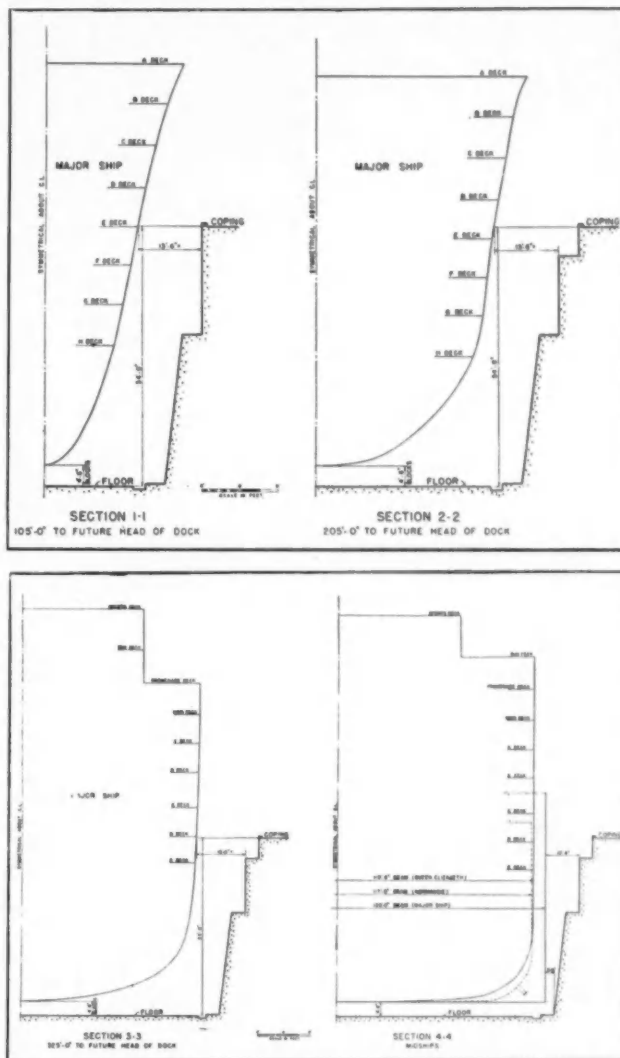


Fig. 3. Ship and Dock Sections.

a new location. While the cost of real estate will be an important factor in the making of a final choice of a site, other factors are thus of great importance. As has been indicated, these include the cost of the necessary improvements and, more particularly, the relative cost between any two sites, not alone for the dry dock itself but for the approaches, berthing space, channels, bulkheading, and such new or additional shop facilities and improvements as the lessee may have to furnish to make it a complete operating plant.

On several of the sites considered, there would appear to be sufficient area to accommodate both a ship repair and a shipbuilding plant. These two industries are not usually combined, and, in connection with this project, we are thinking rather in terms of their co-operative use of such a dry dock and its mutual though differing, advantages to each of them. The absence of an adequate dry dock is a handicap to the construction of superbattleships or the larger merchant ships at this port. On the other hand, the combination of a new shipbuilding plant with direct access to our deep water channels, and also with a large dry dock, might afford a prospect of such advantage to private shipbuilding companies that they might consider the advantages of laying out both shipbuilding and ship repair yards around such a dry dock, or even the use of such a dock in co-operation with another ship repair company.

DESIGN AND PLAN.

The controlling dimensions of width, depth and length have been arrived at after conferences with the Navy Department. The Navy Department has fixed the dimensions of the dry docks now under construction at Puget Sound, Washington, and Pearl Harbour, Hawaii, at a length of 1,000-ft., width of 132-ft. at the

Proposed Large Dry Dock at the Port of New York—continued

top of the keel blocks, and a depth over the sill of 45-ft. This depth is at mean high water. We have naturally based our plans upon these dimensions for a dock at New York. However, in our plans the usable length has been increased to 1,100-ft. to accommodate possible commercial ships of the immediate future and all plans include allowances for an ultimate lengthening to 1,200-ft.—the length of the new Panama Canal locks.

All the Navy's requirements have been taken into account in the tentative layouts and plans. These include minimum berthing space for large ships, depth of approach channels, and the service requirements—cranes, crane tracks, railroad trackage, fresh water, fire protection, steam for heating ships, compressed air and electric power for ship service, lighting, power tools and welding. However, within the time available and in the absence of borings and other detailed information as to the sites, it has obviously been impossible to develop complete studies for each of the areas examined. The layouts which have been considered must therefore be regarded as tentative. Improvements can undoubtedly be made with resulting economies to suit the particular needs or requirements of both the Navy Department and the operator on the site finally selected.

During the course of the investigations made by the Port Authority in 1928, some suggestions were made that consideration be given to a floating dock rather than a graving dock. A graving dock is a dry dock built in an excavation in the foreshore, and in reality a large water basin in which a ship is placed through an opening or entrance which is closed by means of a gate, the water then being removed from the interior by pumping. A floating dock is a special type of dry dock which consists of pontoons with side wing walls. Water is admitted into the interior by flooding valves until the dock is sunk to the proper depth. The ship to be dry docked enters between the wing walls, the interior water is pumped out, and the floating dock rises with the ship resting on it.

We have not considered a floating dry dock for the Port of New York for various reasons, the controlling one being that the Navy Department prefers the graving type of dry dock, especially for its large ships. Such preference is not confined to the Navy Department, but generally speaking, the owners of large commercial ships and their naval architects prefer a graving dock. Directly after the World War a large floating steel dock was built in Southampton, England. It was especially constructed for docking the "Majestic." When the Cunard Steamship Company undertook the building of the "Queen Mary," consideration was given to modifying this floating dry dock to take the "Queen Mary," but the conditions laid down by the Cunard Line and their naval architects as to deflections prohibited consideration of a floating dock for this purpose and consequently a new graving dock of the largest size was built at Southampton for these new Cunarders. Similarly, for the great British naval base at Singapore—a floating dock capable of docking the largest British battleships was designed and built in England and towed to Singapore to create a dry-docking facility that would be available at the earliest possible date. But the British Admiralty then proceeded to build there the largest type of graving dock.

Furthermore, a floating dock in New York Harbour would involve a dredged basin, having a depth, for the maximum requirement, in excess of 70-ft. The deposit of silt in such a deep basin in practically any location would involve constant dredging for maintenance purposes. The annual repair and maintenance cost for such a floating dock would be greater than that for a graving dock and in addition the shorter useful life of a floating dock as compared with a graving dock might complicate financing by a long term bond issue. Graving docks over one hundred years old, such as Dock No. 1 at the New York Navy Yard, are still in satisfactory use.

Turning to the general design features, we propose a full length dry dock designed to accommodate the "ultimate" 1,200-ft. ship. It has been tapered at the head end, in general to fit the shape of the ship. A study of the plan and longitudinal section of the dock is shown in Fig. 1 and the typical cross-section and entrance elevation is shown in Fig. 2. Clearances between the ship and the dock at various points near the head are shown in Fig. 3—Ship and Dock Sections. A circular head has been provided for the length of the dry dock to be built at this time. This head can readily be removed and the dock extended as planned.

The dry dock, as shown on these studies, does not have an intermediate seat. Such an intermediate seat is not required by the Navy, but can be readily provided for merchant ship dry docking, if regarded as desirable by the prospective tenant.¹

(To be continued)

¹If an immediate seat is used, the elevation of its sill and of the sill of the outer and inner caisson seats at the entrance will be 6-in. lower than shown for the entrance elevation of Fig. 2. This added depth of 6-in. is required to permit emergency dockings for naval ships on two foot blocks.

Review

A Port Dictionary of Technical Terms, compiled by the Committee of Standardization and Special Research of the American Association of Port Authorities. Pp. 208. Price 1 dollar. 1940: Office of the Association, 2223, Short Street, New Orleans, Louisiana, U.S.A.

The appearance of a Glossary of Port Nomenclature, as prevalent in the United States, is bound to be of interest to English, no less than to American, port officials. Although there are some terms restricted in their application to American practice, it can be said that by far the greater part of the Dictionary is common ground. Certain words are, perhaps, unfamiliar to English ears, such as Longshoreman, Port Terminal, Belt Line and the like; and a few others have a different meaning to that of their English equivalents, but generally speaking, the reader is more than anything else, struck by the identity of English and American port terms.

The volume, which, at a rough computation, contains something over 2,000 definitions, has been compiled with great care and accuracy by a Committee of the American Association of Port Authorities, working on the basis of a glossary prepared and published by a previous Committee under the chairmanship of Dr. McElwee. To this earlier work, a large number of other words have been added and the compilers in a Foreword express their indebtedness to the United States Maritime Commission for their "invaluable help."

It is perhaps inevitable that there should be occasional divergencies of use and signification among terms in vogue in two countries separated by a wide space of ocean, notwithstanding that the same tongue is spoken by both. One or two instances may be useful and instructive. The most outstanding case is the use of the word Dock. In this country, with its tides of very pronounced range, (though sometimes, and in our view mistakenly, applied to basins without gates) it means an area of water enclosed by gates within which the water is impounded at a fairly constant level. In the United States, where tides are rarely so marked as to require impounding for the purpose of maintaining adequate draught for shipping, the Dictionary definition is "the water area alongside a pier or wharf." Now, during visits to the other side of the Atlantic, we have found that in common usage, the term is applied more frequently, not to the water area, but to the deck of the wharf structure. It is so used in the American daily press and the report of a fatal accident would be worded to the effect that a man "fell off the dock" and was drowned. It is only right to say that the Dictionary under review condemns this use of the term, but nevertheless it has to be admitted that it obtains in common quayside parlance.

Again, whereas in this country most port officials limit the use of the term Dry Dock to the fixed structure alternatively known as a Graving Dock, in America it is equally applied to the floating dock—a structure so different in type and function as to deserve and require a distinct appellation.

A Slip in the United States, according to the Dictionary, is "the open space or tidal dock between piers." There is no corresponding term for such shipping space on this side of the Atlantic; a Slip or Slipway indicates something totally different.

Instances might be multiplied, but the foregoing will suffice to illustrate some of the cases in which words do not carry the same meaning in the two countries.

In the great majority of cases we have found the definitions concise and clear. In one or two instances they might have been improved by compression without detracting from their clarity. Thus the definition of Cubic Contents takes up 24 lines and an example is worked out at inordinate length. In the case taken, viz., the cubic contents of a package measuring 3 feet by 1 foot by 2 feet 6 inches, it was surely unnecessary to reduce the dimensions to inches, multiply them in that extended form and then divide by 1,728 to obtain the result in cubic feet. Any one with the slightest knowledge of arithmetic could see at a glance that $3 \times 1 \times 2\frac{1}{2} = 7\frac{1}{2}$. The example is unfortunate, the calculation of so simple a problem being more suitable for an elementary school-book than for a technical publication for the use of business men and port officials. In fact, Cubic Contents is a term not by any means restricted to port work.

The definition of River Regulation is not too satisfactory. It assumes too much, is vague and indefinite and the statement of the five laws is unnecessarily detailed for a dictionary.

But the book as a whole is certainly a useful and acceptable contribution to the literature on port affairs and it will be of considerable value for reference purposes.

Coaling Plant Additions at Durban.

The coaling appliances at Durban Harbour, Natal, are being augmented by additional plant, costing more than £200,000, in consequence of the increasing overseas demand for South African coal and other minerals. In addition to the existing installation, there is also contemplated the reclamation of a tract of land between Island View and the Bluff Quay with the provision of new plant at an estimated cost of £150,000.

Notes of the Month

Clyde Lighthouse Trust.

Mr. J. C. Graham has recently been elected chairman of the Clyde Lighthouse Trust and Mr. A. N. Lindsay, vice-chairman.

Extensions at Port of Amsterdam.

It is announced on the German radio that the harbour of Amsterdam is to be extended by connecting the West Harbour with the Amsterdam-Rhine Canal.

New Grain Elevator at Buenos Aires.

A large new grain elevator at Basin D Terminal of the new port district of Buenos Aires, which has been under construction for some time, is reported to be at the point of completion. It is expected to be put into commission during March next.

New Oil Plant at La Plata.

The national oil distillery plant at the Port of La Plata, Argentina, is undergoing further extension at a cost of 1,500,000 pesos. The new plant will be put into operation during the month of February.

Proposed Developments at Vigo.

A programme of development works estimated to cost 11 million pesetas has been put in hand by the Works Committee of the Port of Vigo. Of this amount, 10½ million pesetas will be contributed by the Government.

Royal National Lifeboat Institution.

The year 1940 was the busiest of any year in the lifeboat service during its existence of 117 years. Lifeboats were launched on 1,078 occasions and they rescued 2,052 lives. The war accounted for 638 cases of vessels in distress.

Cochin Harbour Works.

The latest press news from India indicates that practically all the works pertaining to the fourth and final stage of the Cochin Harbour works have been completed, including the port railway, which provides a direct service from Madras to Cochin docks.

First British Diesel-Electric Dredger.

A grab hopper dredger, ordered for the Corporation of South-end and just recently put into service, has the distinction of being the first British all-electric dredger. Current is generated by Diesel engines.

Port Administration Changes in Poland.

Since January 1st the management of the ports of Danzig and Gdynia (in German, Gotenhafen) has been centred in a new organisation created by the German Governor of Danzig and West Prussia and called the Gesamthafenbetrieb Danzig-Gotenhafen.

New Dublin Docks Board Chairman.

At a meeting of the Dublin Port and Docks Board on January 9th, Mr. Percy McGrath was elected chairman in the place of Capt. Alan Gordon. Mr. McGrath has been vice-chairman for the past two years. The new vice-chairman is Mr. T. O'Connor.

Suez Canal Company.

The Suez Canal Company have been authorised by an Egyptian military order to pay coupons of bonds in francs instead of in gold, as required by the Statute Law of Egypt. This step is an outcome of the war, since in the present state of affairs the company is not in a position to fulfil its legal obligations.

New Icebreaker for Denmark.

A sum of five million kroner has been approved by the Finance Committee of the Danish Folketing for the provision of an icebreaker, more powerful than any of the existing icebreakers. It is intended to employ the new vessel on the navigable channels between Korsor and Nyborg in order to release the icebreaker Storebjorn for general service.

Trinity House, London.

Trinity House, London, the headquarters of coastal lighting and buoyage in Great Britain has been seriously damaged during recent air raids on London. This has not been allowed to impair its normal functions. At a Special Court of the Corporation on January 7th, the Rt. Hon. A. V. Alexander, First Lord of the Admiralty, was elected an Elder Brother.

New Dry Dock for Chilean Harbour.

Authorisation has been given by the Chilean Ministry of Defence for the construction, by a Joint Chilean and United States concern, of a large new dry dock at the harbour of Caleta Membrillo in Valparaiso Bay. It is to be capable of accommodating battle-ships of 45,000 tons deadweight. The expenditure on the undertaking is estimated at 5 million dollars.

Humber Conservancy Board.

The resignation is announced by Mr. Frank Barrett who was one of the two remaining members of the original Humber Conservancy Board elected in 1908.

New Wharf at Port Darwin.

The Australian Government have accepted a tender of £265,000 for the construction of a wharf at Port Darwin in Northern Australia.

Cork Harbour Finances.

At the January meeting of the Cork Harbour Board, it was reported that the revenue for 1940 had fallen from the previous year's figure of £79,439 to £58,733.

Hartlepool Dock Centenary.

The Victoria Dock at Hartlepool was opened in December, 1840. It had an area of 17 acres and was subsequently converted into a tidal basin, devoted mainly to the coaling of vessels and the accommodation of fishing craft.

Proposal for New Dutch Harbour.

A statement has been made by the German Radio service that a new harbour on modern lines is to be constructed at Bergen-op-Zoom, a port on the Eastern Branch of the Scheldt in Holland. It is to be linked by a canal with the Brabant waterways.

The Albert Canal.

It was announced by German radio that the Albert Canal, Belgium, the completion of which was delayed by the collapse of the banks near Hasselt, in June, 1939, was opened and brought into use on Christmas Day.

Port of New York Traffic.

An analysis of port traffic recently published by the Brooklyn Chamber of Commerce shows that the Port of New York is handling more than 33 per cent. of all the rail-borne export and coastal freight entering the Gulf of Mexico and Atlantic ports.

Retirement of Ship Canal Official.

After 45 years in the Mechanical Department, Mr. William Grosvenor Smith has retired from the service of the Manchester Ship Canal Company. For the past 14 years he has been Chief Mechanical Engineer of the undertaking. He is succeeded by Mr. T. A. Guest.

Nairn Harbour Finances.

The Town Council of Nairn, Scotland, have been discussing the problem of financing repairs required at Nairn Harbour, and, having no funds available for the purpose, they decided to notify the Fisheries Division of the Home Department that they could not see their way to incur further liability in respect of harbour repairs. They accordingly made application for the full amount of £1,046 required for the purpose.

Port Channel Centenary.

The Port of Belfast has recently celebrated the Centenary of the cutting of the first navigable channel for small steamers in the shallow winding course of the River Lagan where it flows into Belfast Lough. This channel has since been developed into the fine waterway which forms the main feature of Belfast Harbour.

Greenock Harbour Maintenance.

In order to meet the cost of upkeep of the docks and harbour at Greenock, the Harbour Trust is promoting a Provincial Order to enable a fund to be set aside from their revenues to be assigned to repairs deferred on account of the war. In normal times, some £10,000 is spent on maintenance. Powers are also being sought in the Order to levy rates on "floating docks, seaplanes, hydroplanes, airships and vessels of exceptional construction or propulsion."

Leith Dock Commission.

At a recent meeting of the Leith Dock Commission, Mr. John Lindsay was re-elected chairman. Reviewing the Commission's affairs, Mr. Lindsay said their work had been seriously affected as a result of the war. Their export coal trade, which was formerly mostly with the Continent, had been severely affected, and at present such trade was principally with the South Coast of England. That had made an extraordinary difference in the dock revenue. Fortunately, within the last two or three months trade had been somewhat better, and they hoped that as time went on the improvement in traffic would be continued. Nothing would be wanting on the part of the Commissioners to attract trade to the port. Mr. Lindsay mentioned that the A.R.P. arrangements would cost well on to £26,000, but part of that sum would be recoverable from the Government.

The Port of Liverpool

An Historical Survey

By J. N. BENSON.

The Geographical Position

IF you look at a map of England you will be able to see why Liverpool has become one of the leading ports in the country. It lies almost in the centre of the British Isles, to the South and East lie the industrious midlands. On one side is Lancashire with its coal mines and atmosphere suitable for the spinning of cotton; on the other lies what is known as the "Cheshire Gap," the plain of Cheshire stretching from the mountains of Derbyshire to those of Wales. The waters of the Irish Sea give her access to Ireland, Wales and Scotland. Trade to and from the hinterland with these countries naturally passed through Liverpool. Chester, until the Dee silted up, was a serious rival for this trade. It was not until she captured the trade of Africa and America that the real start was made in the building up of the Port of Liverpool as we now know it. When this trade started she became not just the gateway of England, but the gateway, to the West, of all Europe. Why is it, that with these advantages Liverpool was so long in coming to the fore? England's main connections both for trade and culture were with Europe, and these moved over the South and East Coasts. All the wealth of the country was in the southern half; the north was almost desolate and very thinly populated. It was not until the 18th Century that the mines and cotton industry began to be developed. Even then, Liverpool was in an isolated position, surrounded by marshy ground. Another reason was, paradoxically, the river, for it led nowhere inland. The three streams that run into the Mersey Estuary are the Mersey, Irwell and Weaver, and none of them was navigable. The roads, where there were any, were not conducive to much transport and so there was no easy through passage which is an essential for the proper working of a port. The story of how the people of Liverpool overcame all these difficulties is the story of Liverpool.

In the Middle Ages

The Pool, a small creek off the Mersey, left the river where the Custom House now stands, its course being marked by Paradise Street, Whitechapel, and the Old Haymarket, and was the centre of the old little town. The inhabitants were mainly agricultural workers, but, at the same time, fishermen, and they used the Pool as a shelter for their boats from the strong tides and stormy weather. They used to catch salmon to such an extent that they even fed the pigs with it. Occasionally a smack from Dublin or Wales would find its way in, and beach in the Pool, to buy cattle or hides, or to sell salt or tar. That would be the extent of the trade around the beginning of the 13th Century.

King John was responsible for germinating the seed of Liverpool's commerce. He was, like other kings since his time, fighting with Ireland, and wanted a port of embarkation for his troops. His attention was caught by the convenient, sheltered creek of Liverpool and he effected an exchange with Henry Fitzwarin, who was then Lord of Liverpool, to whom he gave other lands. In the year 1207, King John issued letters patent inviting settlers to come to his new port, and promising them liberal privileges if they did so.

It was customary, at the time when these letters patent were granted, for all who wished to trade at a place to pay dues and tolls to the lord of the manor, but King John freed the tenants of "burgages" from all such payments, and thereby placed them in a very favourable position for developing commerce. From the rents of the burgesses and trade dues the King only received the sum of £9 a year. The burgesses slowly grew richer and in 1229, for the sum of £6 13s. 4d. they obtained a new charter from King Henry III., who was financially embarrassed at the time. This enabled them to elect their own officers instead of being governed by the royal bailiff, and freed them from the payment of all royal tolls.

In 1333 Edward II. granted a new charter to Liverpool. It was actually only a renewal of previous charters, but round about this time, he granted a series of licences to the burgesses to collect tolls and dues on various kinds of merchandise and to spend the proceeds in paving the streets. Here again, Edward was influenced by the fact that Liverpool was a convenient point for the embarkation of troops.

There is not much evidence of the sea-going trade of the Middle Ages. The main trade was with Ireland which sent hides and wool, and received in exchange woollen cloths from Lancashire and Yorkshire, iron from Furness, and perhaps salt from Cheshire. There was a modest trade with France, whence a certain amount of wine was imported.

At the beginning of the 15th Century Liverpool entered a period of decline. There was trouble between the king and the burgesses over their rights and privileges; the burgesses won by simply defying the king. This weakness of the king, while it helped them in this case, was to prove a stumbling block later on. The feuds between the Stanley and Molyneux families, now Derbys and Seftons, broke out at this time and the king was not strong enough to keep these barons in order. Then followed the Wars of the Roses, fortunately the Stanleys and Molyneuxes were in the same camp, the Yorkists, but even so there was fighting with the men of the Duchy of Lancaster.

By 1557 Liverpool owned 13 vessels, the largest being of 100 tons, manned by 200 seamen; eight years later there were 15 vessels but three of them belonged to Wallasey. The number of seamen had fallen to 80. By the end of the century there were about 20 ships. Up to this time the Customs Dues had been collected at Chester, the turnover at Liverpool being very small, but with the growth of trade Liverpool wanted to be independent. The Chester authorities claimed that Liverpool was only a "creek of its port." This claim was successfully rebutted with the aid of Lord Derby. When Liverpool was given official standing as an independent Customs Port, the authorities did not appoint a Collector as the Chester Collector claimed that his appointment was one for life. It was not until 1664 that James Vernon was appointed first Collector of Customs of Liverpool.

Under the Tudors

Ireland was again helpful in the growth of Liverpool during the reigns of Henry VIII. and Queen Elizabeth. They both conducted campaigns against Ireland and used Liverpool as a port of embarkation. With ships passing constantly between Ireland and Liverpool, the Irish merchants naturally came to Liverpool to buy and sell goods.

In the middle of the 16th Century, the regular Municipal Records of Liverpool begin, and we have a much more minute knowledge of the town's trade. Foreign trade was still small and the bulk of the trade was with Ireland. During three months of 1586, sixteen vessels entered the port, all from Irish ports, their cargoes consisting of linen yarn, hides and sheep skins, and sometimes a little tallow. The linen yarn went to the looms at Manchester, and the hides were tanned in Liverpool. In the same period, 17 vessels sailed for Ireland. They carried much more varied cargoes; coal from Wigan, textiles from Manchester and Kendal, woollens from Yorkshire, Sheffield knives and scythes, pewter goods from Chester, saddles, bridles, soap, and, on one occasion, 1,400 tennis balls and 14 racquets. From this list it will be seen that Liverpool was, as she is to-day, importing raw materials and exporting manufactured articles.

On entering the port, the ship was boarded by a water bailiff, who assigned a place of anchorage to it, and, unless it belonged to a freeman, charged anchorage and wharfage dues. The master of the ship then saw the mayor to arrange terms on which he could dispose of his cargo. He could either make a "town's bargain," whereby the town bought the goods at a fixed price, each freeman taking his own share, or else he could, for a consideration, "have an open market," in which case he could sell his goods on his own terms.

The Stuart Period

The early part of the 17th Century marks the founding of the first British colonies beyond the seas, and the ships of the East India Company making their first voyages round the Cape of Good Hope. Liverpool naturally had its share in the steady growth of prosperity and at this time successfully defeated the claim to superiority made by Chester, because that city had to admit that it possessed no ships at all, its meagre trade was done in small barks.

By the middle of the century Liverpool had become, without doubt, the northern port for Ireland. This trade, started through the Irish wars, expanded fairly rapidly owing to the period of comparative peace which had come to Ireland, the re-peopling of the North by James I., and the consequential setting up of new industries. Not only was this trade developing, but so was trade with Spain and France, and there is even recorded the arrival of a ship from the West Indies laden with tobacco, the start of what was to be a very important transatlantic trade for Liverpool.

The latter half of the 17th Century saw a new beginning in the history of Liverpool. By 1699 burgesses claimed that Liverpool was the third port of England and that "from scarce paying the salaries of the officers of the Customs" it now yielded

*Lecture delivered to the Bromborough Society on November 9th, 1940.

A History of the Port of Liverpool—continued

"upwards of £50,000 per annum" in Customs duties. One of the causes of this increase of trade was the growth of the manufacturing industries of Manchester and East Lancashire, which had now begun to spin cotton, as well as wool and linen. This gave the ships of Liverpool export cargoes, which they took to Ireland, and further afield to Spain and France. They also travelled to the Baltic ports where they began to compete with the ships of Hull.

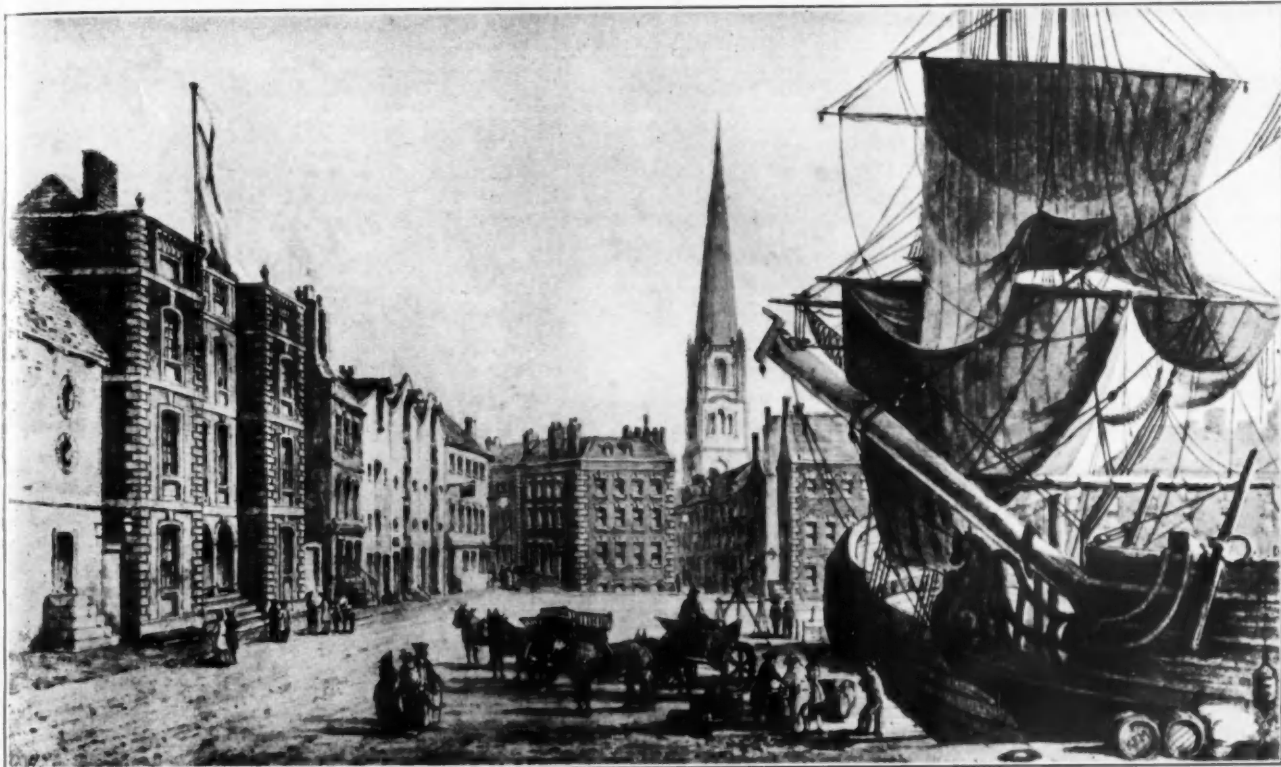
But the most important factor at this stage was the opening up of direct trade with the American colonies, and especially with the West Indies. When William III., preparing to invade Ireland, made enquiries about transport for his troops, the ship-owners did not want the business and quoted prohibitive rates.

The chief commodities imported by the ships were sugar and tobacco. Sugar refineries were set up in the town, the first being

to this Town and view the ground and draw a plan of the intended Dock."

The dock at Rotherhithe had been made by digging a hole in the ground and letting the water in afterwards, but the dock at Liverpool was to be on a much more ambitious scale. The plan was to dam the entrance of the Pool so that when the tide went out the water stayed in. This, as you are all aware, is the method of modern dock working and here we have the original idea that revolutionised, and made very much safer, the work of loading and discharging cargoes. Picton goes so far as to say that this innovation "established a principle without which the commercial marine of England could hardly have existed."

Sir Thomas saw Sorocold again, this time officially, and arranged for him and Henry Huss, a surveyor of Derby, to come to Liverpool in the following March. This work took them six



Old Dock (opened 1715) and Custom House, Liverpool.

built by a Mr. Smith on the north side of Dale Street about 1668. Sir Edward Moore, in those days a leading citizen of Liverpool, joyfully anticipated that this would bring a trade of at least £40,000 a year from the Barbadoes.

More important still was the tobacco trade: Liverpool served Ireland, Scotland, and the North of England with tobacco, and is, to this day, an important centre for that commodity.

The Plague of London, in 1665, and the Great Fire in the following year, also helped Liverpool. These, coupled with the insecurity of southern waters during the Dutch wars of the same years, caused a number of London merchants to find a new seat for their trade at Liverpool. In 1689, when the French wars started, it was safer to bring goods from America to Liverpool round the North of Ireland and by land to London rather than direct to London on account of the French pirates who infested the English Channel.

And so the number of ships in Liverpool increased rapidly, and at the time of William III.'s enquiries, the port had "sixty or seventy good ships of fifty to two hundred tons."

The First Dock

These ships had to load and discharge their cargoes either in the river or in the Pool. The strong tides and storms made this a precarious business and caused a demand for something better. A dock had been built at Rotherhithe about this time but we do not know whether the Liverpool merchants had heard of it. Nevertheless the suggestion was put forward, and Sir Thomas Johnson, a man who had done a great deal for Liverpool and later became mayor of the town, and was, at this time, one of its representatives in Parliament, took up the matter. In January, 1708, he interviewed George Sorocold, a London engineer, to obtain an unofficial opinion. He evidently conveyed this to the members of the Council, for in November, of the same year that body passed a resolution "That Sir Thomas Johnson and Richard Norris, Esq., the representatives in Parliament for this Corporation (being now going to Parliament) be desired and empowered to treat with and agree for a proper person to come

months and we find in an entry in the Town Council Records of the 5th October, 1709, the following:—

"That pursuant to an order of this assembly on the third day of November last, a person was agreed with by Sir Thomas Johnson and Richard Norris, Esq., who hath viewed the ground wherein is intended the making of a convenient Dock for the safety of ships, and that a plan thereof being made, it is conceived that about the sum of six thousand pounds will make and perfect a convenient Dock; and that a Dock being highly necessary for the safety of all ships as well belonging to this Port as to other trading to and from the same—it is ordered and enacted by the assembly, that the ground as now set out, or to be set out, be and is hereby granted and set apart for convenient dock for ever. And that the said Sir Thomas Johnson and Richard Norris, Esq., be requested and are hereby empowered to obtain (this ensuing session of Parliament) such an Act of Parliament for the raising of a sufficient fund for the same, and the making and perfecting of a convenient Dock by such means and methods, and with such clauses, powers, and limitations, as shall be prayed, directed, and agreed on by the merchants and (ship-)owners of this Corporation at a general meeting to be called and had hereafter for that purpose."

The petition was duly presented in Parliament and leave was given for Sir Thomas Johnson and Mr. Norris to prepare and bring in the Bill.

The Bill was brought in on 16th January, 1710, but the Cheesemongers raised objections to it. They maintained that the dock would only be for the benefit of the Liverpool merchants. As the dock was only open at high tide it would hinder rather than assist in the discharge of vessels. They sent a counter-petition to the committee dealing with the Bill but the Bill finally received the Royal Assent on March 24th, to take effect from and after 24th June, 1710.

The Bill was headed:—"An Act for making a convenient Dock or Basin at Liverpool, for the Security of all Ships trading to and from the said Port of Liverpool." It gave permission to the Mayor, Aldermen, Bailiffs and Common Council to build the

A History of the Port of Liverpool—continued

dock. The Corporation had already given the land and had agreed to spend £500 on the project. The Bill gave them permission to borrow not more than £6,000 for the work with the Duties they were to charge as a security. Every ship which used the port had to pay these duties, the only exceptions being the Queen's Ships of War and other vessels in Her Majesty's Service. The limits of the port were set at the Redstones, Hoylake, and from there all over the River Mersey to the Warrington and Frodsham Bridges. To save any trouble with the Chester authorities, a clause in the Bill stipulated that vessels trading with Chester and not touching Liverpool were exempt from such duties.

To ensure the payment of these duties by the captain of a vessel, or other responsible person, a receipt had to be produced at the Custom House before the ship could be cleared. If the Collector of Customs issued a clearance without the production of this receipt, he was liable to a fine of £20.

The Corporation were to appoint Collectors of duties, and they had to deposit some security to show their good faith. The accounts had to be produced, on oath, to the Mayor whenever he required and if a deficiency were found, the receiver's personal property could be seized and sold.

The Pool had evidently been a recognised rubbish tip for the town, and to stop this a clause was put in the Bill making it an offence to throw ballast or rubbish into the dock. The penalty for doing so was £5.

The work of building the dock was not carried out by George Sorocold but by Thomas Steers, who is believed to have been Sorocold's assistant in the building of the Howland Great Wet Dock at Rotherhithe. The name of Thomas Steers is very little known in Liverpool although he spent the greater part of his life there, and was responsible, among other things, for the buoys of the channels (carried out at the Corporation's expense), the first laid-on water supply Liverpool ever had (from the wells at Bootle), the first three docks in the port, and was so well liked by the townspeople that in 1739 they elected him Mayor. Henry Peat, an eminent local historian, tried to remedy this defect and wrote a memoir of Steers. He also, at his own expense, placed a tablet in St. Nicholas Church commemorating him.

Steers' plan was not the same as the original one drawn up by Sorocold; he had set the dock out nearer to the river. His first job was to raise a coffer-dam across the entrance to the Pool to keep out the tides, and he then had to divert the flow of water from the upper reaches of the Pool. When he had finally made his enclosure water-tight, his troubles were far from ended. He was faced with an expanse of soft mud on which to build his dock. When excavations were being made for the building of the present Custom House, which stands on the site of the Old Dock, it was found that the sandstone was eighteen feet below the bottom of the dock and Steers must have excavated that in order to build the walls.

The work took five years and on 31st August, 1715, the dock was opened to shipping. Sir James Picton mentions the *Mulberry*, *Bachelor* and *Robert* as the first ships to enter the dock.

Quoting from Mr. Henry Peat's Memoir:—"The walls of the Old Dock were of brick with stone copings. It was 200 yards long and of irregular breadth, 90 yards in the broadest part and 70 yards in the narrowest, with an area of nearly four acres. The dock gates, made of iron, were 23-ft. in height, and 34-ft. wide. They were well and ingeniously constructed, not only for retaining the water in the dock when the tide was out, but also for regulating the depth of water in the dock according to the height of the tide, by means of openings in the gates and also by sluices which would open below. The draw bridge which crossed the entrance was a finished piece of mechanism, constructed on the Dutch plan." The point of the iron gates has been raised by several authorities and most of them agree that the gates were most likely, not of iron, but British oak which was, as Mr. William Brodie, formerly Assistant Dock Engineer, said in 1897, "a material the use of which was continued for all Liverpool gates until comparatively recent times. Between the dock gates and the river, Steers constructed an octagonal basin and, on its north side, he built a small graving dock."

With water flowing in and out of the docks at high tide, mud accumulated in the bottom. To-day, this is cleaned out by dredging. In 1736 it was found necessary to clean out the mud accumulated in the Old Dock and the only way to do this was to close the dock to shipping. A contract was given to John Martindale to carry out the work for £550, and it took him five-and-a-half months to complete. The annoyance caused by this led to a demand for more dock accommodation and the creation of more docks.

Further Dock Construction

In 1738, an Act of Parliament was obtained giving the Corporation power to provide this additional accommodation. The Petition by the merchants of Liverpool and others in favour of more docks urged as a reason that the then existing docks were sometimes so crowded that ships with very valuable cargoes were obliged to lie in the channel of the river exposed to wind and sea in a very rapid stream, and that room at the quays was inadequate for the loading and discharging of ships.

Thomas Steers was again entrusted with the building of this dock; but, in 1750, three years before it was completed, the man responsible for what has been described as the "Cradle of the Port of Liverpool," died on the 2nd day of November. During the last two years of his life he had been in bad health and the work had devolved upon his clerk, Henry Berry. With the passing of Steers, the Corporation asked Berry to take over the completion of the work. The dock was opened to shipping in 1753 and was known as the South Dock. The name was later changed to the Salthouse Dock on account of the salt works then situated at its side.

These salt works belonged to the Blackburn family of Orford Hall, near Warrington. At that time, the manufacture of salt was one of Liverpool's chief industries, the crude salt being brought by barge from Northwich and Dungeon Point, near Hale, and taken to the salt house where it was crushed and converted into brine, and then evaporated. The owners were later obliged to apply to Parliament for permission to have their works removed to Garston owing to the congestion of vessels in the dock.

(To be continued)

Notable Port Personalities

VII.—Sir Richard Durning Holt, Bart., LL.D.

Sir Richard Durning Holt, Bart., Chairman of the Mersey Docks and Harbour Board, and senior partner in the firm of Alfred Holt and Co., Liverpool—the Blue Funnel Line—was born in 1868, and is a son of the late Mr. Robert D. Holt, who was Liverpool's first Lord Mayor. He was educated at Winchester and New College, Oxford, and soon after his admission as a partner in the firm of Alfred Holt and Co., was introduced into the political arena by his father, who was at that time leader of the local Liberal Party. Subsequently he represented the Hexham Division of Northumberland in Parliament for eleven



Sir RICHARD DURNING HOLT, Bart., LL.D.

years (1907-1918), while other constituencies which he has contested include West Derby, Eccles, Rossendale and North Cumberland. Sir Richard was first elected a member of the Mersey Docks and Harbour Board in 1896 to fill the vacancy caused by the death of his uncle, Mr. George Holt, while another uncle, the late Mr. Alfred Holt (who was founder of the Blue Funnel Line) was chairman of the Board from 1889 to 1890. In 1935, for his services to shipping and to the Port of Liverpool, the honour of a baronetcy was conferred upon him. In the following year he was elected vice-president of the Chamber of Shipping and he became president of the Chamber in 1937.

Since 1932 Sir Richard has been Chairman of the Elder Dempster Lines, Ltd., and from 1934 he has been deputy-chairman of Martins Bank, Ltd. He is also Chairman of the Glen Line, Ltd., and a Director of the China Mutual Steam Navigation Co., Ltd., Elder Dempster Lines Holdings, Ltd., India Buildings, Ltd., the Ocean Steam Ship Co., Ltd., and the Tientsin Lighter Co., Ltd. He is a vice-president of the Dock and Harbour Authorities' Association. The honorary degree of LL.D. was conferred upon him in 1933 by Liverpool University.

Sir Richard has been Chairman of the Mersey Docks and Harbour Board since May 26th, 1927.

Ancient Harbours

Being the Presidential Address of Sir Leopold Halliday Savile, K.C.B., to the Institution of Civil Engineers, November, 1940

(Continued from page 63).

Tyre

Tyre was another famous pre-hellenic harbour (figs. 7 and 8), but it is only a few years ago that a true plan of its works was published by Père A. Poidebard. As a result of 3 years' research, from 1934 to 1936, in which he made brilliant use of aerial observation and photography, coupled with submarine observation and photography, Poidebard was able to demonstrate the incorrectness of all previous plans and the unreliability of any plan made of ancient works unchecked by careful research and observation on the spot.

History has given the Phœnicians a reputation as builders and engineers. A delightful story is told by Herodotus in his description of the cutting of the Canal of Athos, which illustrates their skill as engineers. "When the trench grew deep," he writes, "the workmen at the bottom continued to dig, while others handed the earth, as it was dug out, to labourers placed

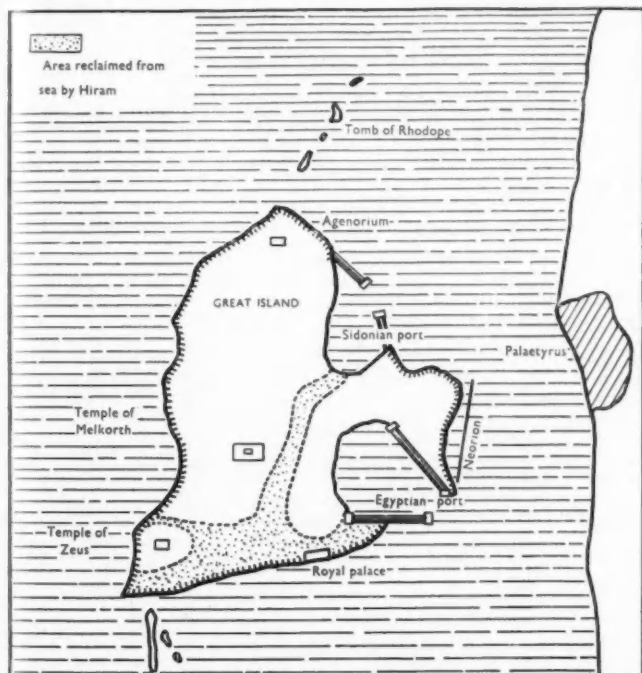


Fig. 7. Tyre. (Note incorrect position of Egyptian Harbour).

higher up upon ladders, and these taking it, passed it on further, till it came at last to those at the top, who carried it off and emptied it away. All other nations, therefore, except the Phœnicians, had double labour; for the sides of the trench fell in continually, as could not but happen, since they made the width no greater at the top than it was required to be at the bottom. But the Phœnicians showed in this the skill which they are wont to exhibit in all their undertakings. For in the portion of the work which was allotted to them they began by making the trench at the top twice as wide as the prescribed measure, and then as they dug downwards approached the sides nearer and nearer together, so that when they reached the bottom their part of the work was the same width as the rest." As builders they are, as everyone knows, renowned for the work they did for Solomon in building the temple of Jerusalem, whose "great stones," "wrought stones," and massive brass pillars 18 cubits high, modelled on those in the Temple of Melkart, at Tyre, so impressed the Jews.

Tyre had two harbours (fig. 8), the Sidonian on the north of the island and the Egyptian on the south, and like Pharos, a spacious roadstead to protect ships from the stress of the open sea when making the entrances. The Sidonian was what the ancients called a closed (kleistos) harbour; that is to say, it was within the circumvallation of the city and its entrance could be blocked by suspending a chain from one side to the other. The Egyptian was an open (aneimenos) harbour, outside the fortifications but adjoining them.

Tyre was a very old city, dating back, according to Herodotus, to 2750 B.C. This is probably incorrect, but at all events by 1400 B.C. its renown was widespread, and by 1100 B.C. its seamen had passed Gibraltar and had dared the Atlantic. It was probably about this time that the Sidonian Harbour was built. Hiram, King of Tyre (970-936 B.C.) friend and ally of Solomon, was a great builder and engineer. When he came to the throne Tyre was separated into three islands by arms of the sea full of reefs. Hiram filled these channels and on part of the land so reclaimed built the Egyptian harbour, not as Maspero and others have asserted, on the south-east of the island, as Père Poidebard's discoveries have shown, along its south coast (figs. 7 and 8). A massive mole, 2,500-ft. long, runs from the south-east corner to a large exposed rock lying off the south-west corner. Two similar moles, one running northwards from the rock at the end of the south mole, and the other running southwards from the shore of the island, enclosed the harbour on the west. The ends of these walls overlapped so as to form a protected entrance from the open sea to the western basin.

Two marked advances had occurred in constructional methods since the days when Pharos was built, namely, the use of concrete in making sea walls, and the use of iron dowels run in with lead. Both of these methods were used at Tyre.

The moles were very solid structures (figs. 9 and 10). They had foundations of large, hewn, rectangular blocks, all laid as headers. The middle was composed of hard concrete divided at intervals into compartments by transverse bonding. The side bordering the sea was faced with squared slabs, 10-ft. long by 4½-ft. thick, laid as stretchers. The south mole varied in width from 24-ft. to 26-ft., whilst the two western moles, which had to face the full force of the sea, were 7½-ft. wider.

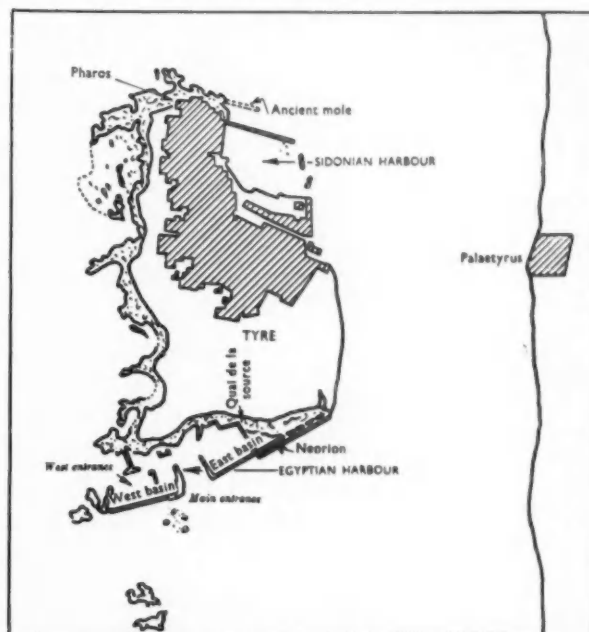


Fig. 8. Tyre. (Showing correct position of Egyptian Harbour).

In the middle of the south mole was the main entrance to the harbour, and from each side of it two large wharfs, built of concrete and faced with stone, were built across the interior for about two-thirds of its width. The narrow passage thus formed was commanded by a fortified post on the island. This passage was the boundary between the Western and Eastern basins.

A concrete wharf, the "Quai de la Source" on Père Poidebard's plan, cut the eastern basin into two, the farther and smaller one of which appears to have been paved throughout with flagstones and to have been used as a "neorion," or shipbuilding and repairing yard, equipped with slips and storehouses. Père Poidebard thinks that it may have communicated with its neighbouring basin by means of an inclined plane, but M. Berthou thought it had direct access to the sea. Possibly both methods existed. At the northern corner of the outer eastern basin, where the "Quai de la Source" abuts the island, was a small basin which accommodated a drinking-water tank for replenishing

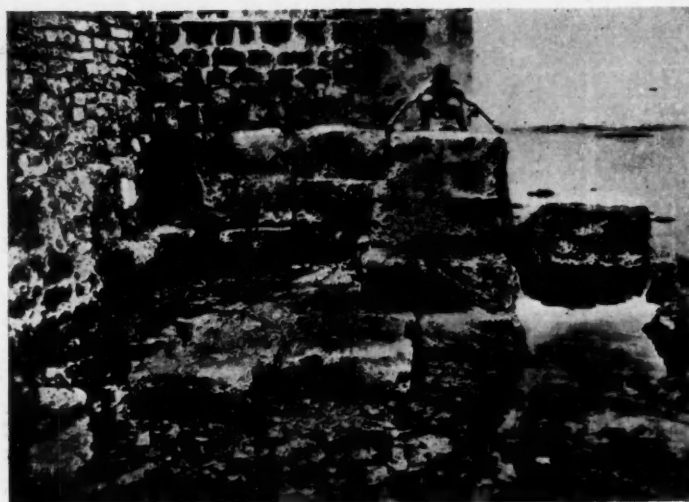
Ancient Harbours—continued

Fig. 9. Foundations of the Moles of the Sidonian Harbour.



Fig. 10. Foundations of the Moles of the Sidonian Harbour.

ships—an important item, for water was precious in Tyre, nearly the whole supply of the island having to be brought across by boat from springs on the mainland.

The Sidonian harbour made use of a small bay at the north-east side of the island and was partly surrounded by the city. Two jetties, one jutting out from the ancient tower near the modern lighthouse and the other coming from the opposite side in a northerly direction to meet it, protected its entrance. Père Poidebard was able to trace the northern jetty, and thus to prove that it lay some distance beyond the existing jetty of Sur and that the ancient harbour was larger than the modern. The construction of the jetties was similar to that of the moles in the Egyptian harbour.

Old authorities record that the two harbours were connected by a canal, and many old plans show this canal, but it is not shown on Père Poidebard's plan, or on Berthou's, made in 1846. It is, however, possible that there was communication through the arm of the sea said to have been reclaimed by Hiram. It was a common custom in ancient harbours to have two separate but inter-connected basins, and Sidon, which also belonged to the Phœnicians, was laid out on this plan, which had obvious advantages. Vessels could enter one of the basins when a contrary wind prevented them from entering the other; if one basin was made unsafe by a storm, ships could move through the canal and take refuge in its neighbour; whilst if an enemy attacked he would have to split up his fleet or risk being surprised by the defenders who, having escaped through the other entrance, might attack him in the rear.

In addition to its harbours, Tyre took care to protect its roadsteads (fig. 11). North and south of the island ridges of rock, partly submerged and partly exposed, stretched parallel to the coast and formed a natural barrier against the waves. That they were not, however, considered sufficiently effective has been made clear by Père Poidebard's discovery of traces of two separate lengths of wall based on the southern line of reefs, one about 1,000-ft. and the other 1,650-ft. in length. These walls were of massive structure, 100-ft. wide, and were faced with rocks some of which were 10-ft. square by 2½-ft. thick and weighed about 15 tons. Probably, although sufficient evidence is not yet available, there was a similar reinforcement of the north reef. Traces seem still to have been in existence when Maundrell visited Tyre in 1697, for he reports that the harbours were, "in part defended from the ocean, each by a long ridge resembling a mole stretching directly out on both sides, from the head of the island; but these ridges, whether they were walls or rocks, whether the work of art or of nature, I was too distant to discern." That they were in part works of art is proved by the fact that the stone used is different from the rocks upon which it is laid, and that it must have come from quarries on the mainland where a similar stone is found. One cannot help wishing that more information was available as to how these immense masses of stone were conveyed to the spot and laid with such accuracy. Mr. Henri Watier, whom Poidebard consulted, considered the construction of such works perfectly practicable in antiquity. "Several divers could," he says, "easily push stones of 9 tons weight into place as they were being let down by ropes." The divers of Tyre, who were accustomed to collect the shell fish *murex* for the famous purple dye, would be ideal for such work. It is known that they could remain below water for 1½ minutes.

Tyre enjoyed many centuries of fame as the finest and richest city in the world. Ali will recall the three vivid chapters in which the prophet Ezekiel describes the city and foretells its fall—"thy riches, and thy wares, thy merchandise, thy mariners and thy pilots, thy calkers, and the exchangers of thy merchandise, and all they men of war, with all thy company which is in the midst of

thee, shall fall into the heart of the seas in the day of thy ruin." Even in the bitterness of his scorn he cannot refrain from a note of admiration; "by thy wisdom and by thine understanding thou hast gotten these things."

Five hundred and eighty years after the death of Hiram came Alexander the Great. Tyre, unconquered still, was too great a danger to leave behind him while he was away subduing the East. Alexander's fleet was too weak to fight her at sea. Nothing daunted, he attacked from the land, and for this purpose he built a colossal mole 100-ft. wide and half-mile long in three fathoms of water, so that Tyre ceased to be an island and became a peninsula. He demolished the old city of Palætyrus for stone and robbed the forests of Lebanon for timber to accomplish his purpose. In nine months he completed his task and captured the city. The laws of nature asserted themselves; coastal drift completed what Alexander began, and now Sur, the ancient Tyre, is connected to Syria by a broad neck of land.

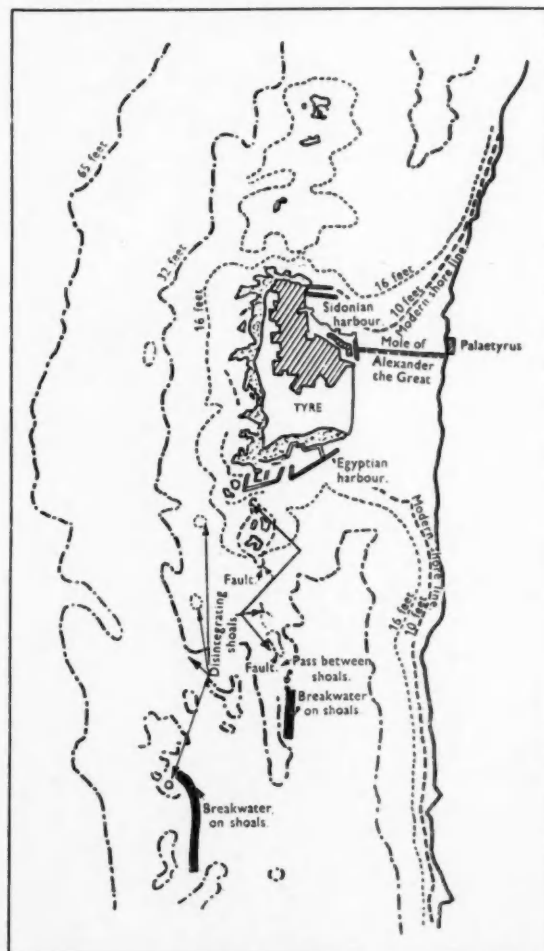


Fig. 11. Roadstead and Remains of Breakwater on Shoals, Tyre.

The following interesting example will illustrate the efficiency of the ancient harbour engineer. Some years ago a friend of mine went out to advise on the construction of a harbour in the Black

Ancient Harbours—continued

Sea. After careful study, he recommended a plan for a rubble stone breakwater protecting a deep-water pier. On his return his ship called at Samsoun, the ancient colony of Amisus. As he had never been at Samsoun before, he went ashore to look around, and was interested to find the ruins of a rubble breakwater, sheltering a massive quay wall, made of great blocks of masonry, which might almost have been built to the plans he had just drawn

by a series of porticos, the centre of commercial activities; near the entrance to the corn harbour was another large *agora*. Around the three harbours shipsteads were built, in which vessels could lie high and dry. They formed an essential part of the dockyard, especially for warships, which put to sea only on active service. If the triremes were left lying in the water they soon became leaky and unseaworthy, and also were liable to be attacked by the

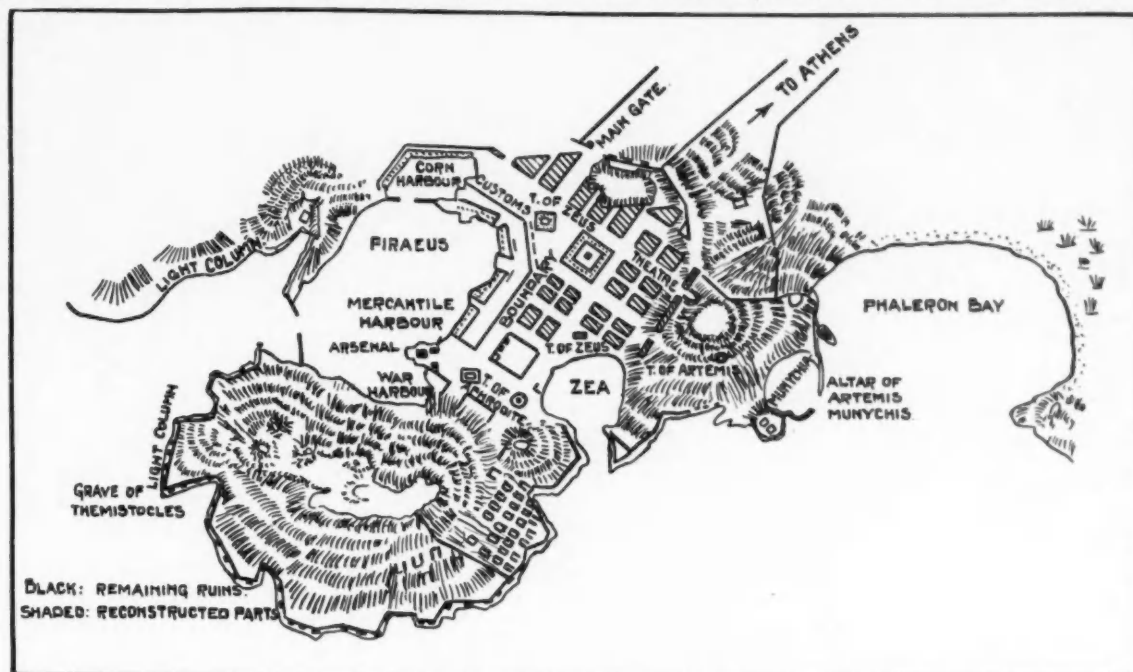


Fig. 12. Plan of Piræus, Zea and Munychia.

up. The ruins dated back to the days of Darius, say about 500 B.C. and I am very tempted to see in them the "wisdom and understanding" of a Tyrian engineer, for it is known that the Phœnician interests extended thus far. Perhaps there is a powerful *genius loci* in the Black Sea; be that as it may, it is interesting that a Phœnician engineer (if my surmise is right) and a British engineer, separated in time by 2½ millenia, should have solved a problem in almost exactly the same way.

Grecian Harbours

When we come to Grecian times a rather different state of things is found. The shores of Greece and those of most of her colonies abounded in deep bays and long arms of the sea stretching inland, forming excellent natural harbours that required little in the way of artificial works to make them safe refuges. Moreover, Greece was divided into many small states, each of which, except Doris, Arcadia, and a few others with no seaboard, had its own port. Great harbours of cyclopean stonework like Pharos and Tyre were, therefore, unnecessary. Generally all that their natural harbours needed, apart from quays and wharfs, were short moles to narrow the entrance.

In the early days Athens used the broad open bay of Phalerum, where ships were beached in sight of the city. That arrangement had several disadvantages. In a surprise attack the enemy might land and paralyse the defenders before they could get down from the city and launch their ships; a more serious and permanent objection was that vessels had to lie out in the open exposed to the elements, an important fact when it is remembered that no voyages were undertaken between November and March. When the Persian danger arose Themistocles, in 493 B.C., persuaded the Athenians to transfer their shipping to the fine natural harbour of Piræus and its two small neighbouring land-locked bays of Zea and Munychia (Fig. 12). The works initiated by Themistocles and completed by Pericles gave Athens one of the safest and most convenient harbours in the ancient world. All three harbours were enclosed in one circuit of fortifications and connected to the city by the two famous long walls. The natural entrances to Piræus and Munychia were reduced in width to 55 yards and 45 yards respectively by the construction of solid breakwaters. Zea needed no narrowing. Apparently those breakwaters were constructed by heavy rubble thrown into the water and allowed to assume a natural slope. When the mound thus formed reached water level a superstructure of huge blocks, some of them 10-ft. square, fastened together with iron cramps, run in with molten lead, was built. This was the usual type of Grecian pier. Piræus, the main harbour, was divided into three chief basins, the mercantile harbour, in the centre, which occupied most of the area, the small corn harbour on the north, and the war harbour in the south. In the centre was the *agora*, or market, of Hoppodamus; on the western margin of the War Harbour (the *Kantharos*) extended the emporium or *deigma*, flanked

by a series of porticos, the centre of commercial activities; near the entrance to the corn harbour was another large *agora*. Around the three harbours shipsteads were built, in which vessels could lie high and dry. They formed an essential part of the dockyard, especially for warships, which put to sea only on active service. If the triremes were left lying in the water they soon became leaky and unseaworthy, and also were liable to be attacked by the

teredo. Their wooden fittings were stored alongside the vessels in the shipsteads; hanging tackle, sails, and ropes were kept in the large arsenal at the entrance to the War Harbour. Traces of such buildings in Zea and Munychia are still in existence; those around Zea were roofed by low gables supported on stone columns, each gable sheltering two triremes.

Piræus, Zea, and Munychia were typical examples of the Greek natural harbours. At some places, however, artificial harbours had to be constructed, of which that at Eleusis (fig. 13) may be regarded as typical, as the others were planned on a similar general principle. Two breakwaters were built out from the shore, curving inwards to form a narrow entrance between their ends, the space enclosed being an obvious imitation of a natural bay.

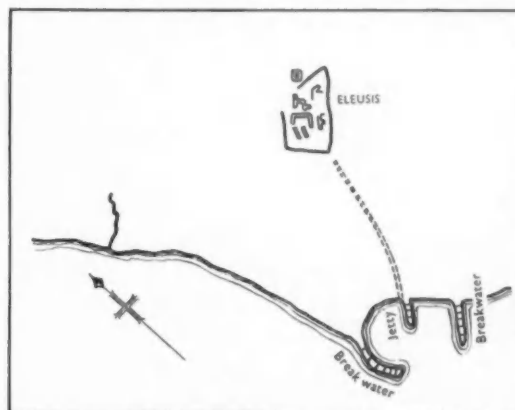


Fig. 13. Eleusis Harbour.

Within the harbour was a jetty. This jetty and the breakwater were constructed in the same way, with a foundation of dumped stone and a superstructure of large blocks held together by iron dowels. In all cases the material used was stone, probably because the art of pile-driving was not yet sufficiently developed to make the use of piles safe in harbour engineering, although piling had already been used in house-building for many centuries, and probably, also, because piles were liable to attack by *teredo*.

(To be continued)

Impending Developments at Finnish Port.

It is announced that important harbour extension works are to be under taken at the port of Kotka, Finland. The cost is estimated at between 80,000,000 and 100,000,000 Finnish marks. In the opinion of the promoters of the scheme, these new works will make Kotka the largest timber-exporting port in the Baltic, with an estimated annual output of 3,300,000 tons.

The Evolution of the Port Authority Plan in American Administrative Law

By JULIUS HENRY COHEN,
General Counsel of The Port of New York Authority*

(Concluded from page 67)

Port Authority Activities

The staff carries on the work of the Commission which, in addition to administrative activities, consists of four principal phases—1, Studies with respect to Port Development; 2, Construction; 3, Operation; 4, Protection of the Port. Related to these, of course, are subsidiary problems of finance, real estate, law and legislation, public relations, purchasing, insurance, medical and welfare work, etc.

The work of the Port Authority in the field of construction and operation is well known. It includes the construction and operation of the George Washington Bridge, the Lincoln Tunnel, the Outerbridge Crossing and the two Arthur Kill Bridges—the latter three connecting Staten Island with the mainland at New Jersey—the Inland Terminal. Finally, it includes the operation of the Holland Tunnel.

However, the other phases of the Port Authority work are equally important although they may not be as well known. For example, the Port Authority is now engaged in making detailed studies on the subject of suburban transit for northern New Jersey. Similarly the staff is making preliminary studies with respect to the New York Westchester and Boston Railway which served part of Westchester County until it was shut down several years ago. This is typical of the planning activities of our staff and represents considerable work.

Recently the Port Authority announced that studies and conferences are now taking place between committees representing the over-the-road motor truck industry and the Port Authority on the subject of union motor truck terminals in order to find ways to reduce costs and to relieve street congestion.

The rapid growth of the over-the-road motor truck movement⁴⁰ in recent years has presented new problems in terminal freight handling costs which we believe can only be solved by the unification of truck terminals. Union motor truck terminal development in the New York area has lagged behind Chicago, Detroit, and many other points.

Time permits only a very brief mention of many other matters in the field of port development that the Port Authority is engaged in. When Congress authorized the establishment of foreign trade zones or "free ports" in the United States about two years ago the Port Authority was asked by New York City and later by Elizabeth and Newark to make, for each municipality, a study of the economic possibility of a foreign trade zone in their respective communities. These studies were made and the City of New York has opened the first foreign trade zone in the United States on Staten Island. Recently we completed a study for the City of New York for a transatlantic air base.

A comprehensive study of the need for a large dry dock in the Port of New York was made several years ago, at the request of the State of New Jersey. New York is the only port on this side of the Atlantic that regularly handles super-liners in excess of 900-ft. long and yet it has no dry dock capable of taking a boat over 730-ft. in length.⁴¹ Because most of these super-liners fly foreign flags and dry dock in their home ports, such a large facility at New York would only be used in rare emergencies by these super-liners.

At the present time, however, the construction of a large dry dock in the New York Harbour is a matter of national defence. It is a fact that warships presently under construction, including one now on the ways at the Brooklyn Navy Yard, could not be dry docked in this harbour. As the result of world conditions and the necessity of building up our national defence, the United States Navy Department is anxious to obtain such a dry dock in this port.

The Port Authority is constantly co-operating with various Federal departments in the improvement of the commercial assets of the Port. Thus it works in co-operation with the Army Engineers towards deeper channels and adequate bridge clearances; with the Treasury Department for simplified Customs regulations; with the Coast Guard for clearing channels of floating ice; with the Department of Commerce for the regulation of hazardous cargoes; with the Department of Agriculture with respect to food terminals; with the Public Health Service

with respect to quarantine regulations; with the New York City Department of Docks with respect to accommodation for super-liners and many local fire and police departments.

Lastly, in the field of port protection, the Port Authority performs a very important function. While nearly 50% of our general cargo overseas traffic originates in or is destined to points within the Port District, much of the remaining 50% is highly competitive business from interior points. Prior to the World War, New York enjoyed a substantial majority of the Nation's high class merchandise export and import trade, just as it now handles 95% of the overseas passenger trade. Other ports are strong in specific commodities such as grain, coal, lumber, oil, cotton, tobacco, naval stores, etc. The War stimulated port terminal construction at the outports and left them upon its conclusion with modern facilities greatly in excess of their traffic needs. Furthermore the Federal Government was committed to a policy of encouraging the expansion of port facilities in anticipation of future international emergencies. Many communities and some states expended millions of dollars on new docks, wharves and other terminal facilities, and then naturally set out to secure a large part of the available tonnage. They found, however, that artificial stimulus was needed to attract business out of its normal channels. This stimulus has taken the form of efforts to secure preferential freight rates lower than rates to New York, apparently akin to the theory of golf handicapping, namely, that the poor player needs a favourable handicap to get in the game. The outports freely admit the advantages of shipping via New York, but deny our right to enjoy them unhandicapped. Unfortunately, the export and import business of the country is not a mere golf game but involves hundreds of millions of dollars invested in property and equipment as well as the livelihood for hundreds of thousands of men and their families not to be uprooted by artificial and unnatural shifts in the current of world trade induced by tampering with freight rates.

For years, there has been a port differential battle of one kind or another pending before the Interstate Commerce Commission involving competitive rates for the interior of the country to the various tide-water ports. Baltimore enjoys a differential of 60 cents a ton under New York from points west of Pittsburgh and this is enough to divert cargoes of heavy tonnage such as ore, steel, wood pulp, etc., away from New York since this apparently small differential can easily amount to as much as \$3,000 in inland freight charges on a medium size cargo of Scandinavian wood pulp. Baltimore enjoys the lowest rate on the Atlantic Coast with Philadelphia 40 cents a ton higher, New York and Boston on a parity at 60 cents a ton higher but competition is not limited to the Atlantic ports. On the north we have Montreal and Quebec draining traffic out of the Great Lakes Basin at rates that are not wholly subject to the control of our Interstate Commerce Commission. Similarly, to the south-west New Orleans, at about the same distance as New York from Chicago, enjoys a federal waterway route and in addition a line of railroad freight rates from the Upper Mississippi Valley and from parts of the Ohio River Valley that are materially lower than New York. I have in mind at the moment a so-called "all commodity" rate for export from Chicago to New Orleans that is 17 per cent. under the comparable rate to New York, resulting in a differential of \$3.80 per ton. In another instance rates on unboxed automobiles from Detroit moved out to New Orleans for several years at a rate which gave an advantage of \$3.40 per ton to that port as compared to New York although the distance from Detroit to New Orleans is 1,040 miles whereas it is less than 700 to New York. Happily, after a great deal of effort, this situation has been modified so that the rates to New York and New Orleans are in more reasonable adjustment.

New York used to handle 100,000,000 bushels of grain a year, the majority being Canadian grain which ripened late in the season and moved out via New York after the Ports of Montreal and Quebec were frozen. Strangely enough American grown export grain, which ripens in the late summer, has always moved out of the Great Lakes Basin by way of the St. Lawrence utilising the all-water route available via the Welland Canal.

Due to a combination of circumstances in which the British Empire tariff preferences and customs regulations played an important part, the flow of Canadian grain through New York to the United Kingdom almost ceased from 1932 to 1938. The

*A Lecture delivered at the New York University School of Law, on March 13th, 1940.

⁴⁰For Footnotes see end of article.

Evolution of the Port Authority Plan in American Administrative Law—continued

matter was so serious that the various U.S. port and transportation interests joined, under the leadership of the Port of New York Authority, in a concerted move to have these restrictions eliminated. With the co-operation of the State Department this was accomplished in the reciprocal trade agreement negotiated with the United Kingdom, which became operative January 1st, 1939, and Canadian grain is once more moving through our port in volume.

When you consider that the Port Authority started with no credit rating and has since constructed such theretofore untried and unproven facilities as the George Washington Bridge, and that it has in a short space of nineteen years reached the credit position where its obligations sell on a credit parity with the best state and municipal issues—are rated as "A" by Moody's,—you will appreciate how successful has been the working out of the pledge of co-operation by the States to each other in 1921.



Lower End of Manhattan Island.

I mention these few instances taken from a long list of port protection problems to illustrate the kind of activities in which our staff engages, and about which very little is known by the general public.

Funds for Port Authority Activities

You may very well ask now, how the Port Authority gets the money to carry on these activities, and I shall try to sketch the financial picture of the Port Authority, very briefly.

The Port Authority has now sold more than Two Hundred Millions of Dollars of its bonds to the public in the effectuation of its various facilities.⁴² These obligations are the obligations of The Port of New York Authority alone; they are not guaranteed by the states. Unlike a state or city, the Port Authority has no taxing powers, and accordingly, its bonds are what are known as revenue bonds.⁴³ By that I mean, the bondholder must look to the revenues derived from the various facilities for the payment of interest and amortization upon these obligations. In short, the combined tolls and revenues from the operation of the George Washington Bridge, the Lincoln Tunnel, the Holland Tunnel, the Staten Island Bridges and the Inland Terminal are available to pay the interest and principal upon Port Authority bonds.

Thus you see all of the Port Authority tolls and revenues are appropriated or, as we call it, pledged to bondholders. However, as a prior charge, the Port Authority pays the operation and maintenance costs out of tolls. Included in operation costs are amounts which represent an appropriate proportion of the cost of administering the Port Authority. It is, therefore, out of the tolls and revenues that the Port Authority derives the moneys for its general administrative operations.

Under a declaration of state policy in 1931,⁴⁴ the Port Authority pools all of the revenue from the several facilities—those which earn all their charges and those which do not. As a result the Port Authority has been able to carry on and offer the inhabitants of the Port District a modern and efficient trans-Hudson network of vehicular crossings without adding one penny to the taxpayers' burden.

Some of the Port Authority's Legal Problems

Now, having covered the history and creation of the Port Authority as well as its method of operation, may I outline very briefly some of our legal problems?

The primary reason for creating the new type of agency, as I pointed out earlier, was that it seemed to offer the most practical method of insuring the requisite co-ordination of the endeavours of the two states in handling an inter-state problem. The new type of agency seemed to combine the advantages of Government ownership and control with the benefits secured through such business-like administration as is found in corporate management and finance. To achieve these objectives and to resolve also the difficulties arising out of the bi-state nature of the problem, the States of New York and New Jersey evolved the "Authority plan." The Port of New York Authority was the pioneer in this field.

We might well ask, in terms of legal entity, what kind of agency was created? It is simple to answer that it is called an "Authority." But when the Port Authority was first established there was—and even now there is—no established legal meaning to that name. Over the course of centuries a whole volume of legal rights and obligations immediately comes to mind when we use such names as "municipal corporation," "city," "state," on the one hand. On the other hand a similar volume of legal rights comes to mind when we refer to "stock corporation," "joint association," "partnership," "joint venture" and the like.

As experts in Administrative Law, you need not be told that when a new type of entity, such as this, is created, the law does not start afresh; the Courts do not seek to define rights and duties of "an Authority" as such. Rather, the traditional legal technique is to try to fit the new type of agency into the accepted patterns of law. For example, a sovereign state is immune from suit; a municipal corporation, although suable, is not liable for torts arising out of the performance of a governmental function. Private corporations are, of course, always subject to suit and liability. The question then arises: Is an Authority subject to suit? One way in which the question might be answered

Evolution of the Port Authority Plan in American Administrative Law—continued

would be to consider the whole problem *de novo*, working only to the question whether an Authority should be immune from suit. However, the answer is usually not solved that way. The thinking in this field of the law by the courts is that the Authority is more closely identified with the two states than is either a municipal corporation or a private corporation.

The problem of fitting the Authority into accepted definitions is always with us in the Law Department, but sometimes the identification need not be as sharp as in the case of immunity from suit. For instance, public property used for a public purpose is exempt from municipal taxation, whereas private property is uniformly subject to such taxes. In other words, in answering the question of tax exemption in a given case, it may be sufficient to decide only whether the Port Authority is a public, as distinguished from a private, agency.

An excellent illustration of our problem is afforded in the recent decision by the Court of Appeals in "Bush Terminal Co. v. The City of New York."^{44a} The question there was whether the Port Authority could validly enter into an agreement with the City of New York, pursuant to statute,⁴⁵ whereby the Port Authority would pay the City of New York an annual sum in lieu of taxes which the City would have derived from the properties formerly located on the block now occupied by the Port Authority Inland Terminal No. 1. The Court of Appeals has held that such an agreement is valid and accordingly the Inland Terminal No. 1 is exempt from the real estate taxes by the City of New York. In presenting the argument to the Court of Appeals it was contended that the tax law of the State of New York specifically exempts from taxation property of the state and "property of a municipal corporation of the state held for a public use."⁴⁶ The Court of Appeals said:

"Though the comprehensive plan declares that the Port Authority shall be regarded as 'the municipal corporate instrumentality of the two States for the purpose of developing the port,' it is not in strict sense 'a municipal corporation' of the State of New York, and under a strict literal construction of the Tax Law its property might be subject to taxation. A 'municipal corporate instrumentality' of two States is a creature of statute and is unknown to the common law; but argument, certainly not without force, may be made that on common law principles the property of an agency created by two States should be free from taxation by either State and that into the compact creating the municipal corporate instrumentality there must be read by implication a provision that the property of the municipal corporate instrumentality so created should be entitled to the same immunity from taxation which property of a municipal corporation created by each State would enjoy."

There is still another reason why we have had to solve most of our problems by analogising the Authority with more traditional types of agencies. I refer to the fact that there is a great mass of statute law which has been drafted primarily with the traditional types of entity in mind.

For instance, a section of the banking law⁴⁷ placed restrictions on loans, purchase of securities and total liabilities to a bank of any one person. However, an exception was made in the case of "the total liability to such bank, of any state other than the State of New York, or of any foreign nation, 'or of a municipal' railroad corporation * * *." The question is whether the Port Authority comes within the spirit and purpose of the exception, though admittedly the Port Authority is not a municipal corporation in the strict sense that the term implies, i.e., a city, town or village having elected officials and exercising the taxing power. I mention this merely as an example of some of our problems in interpreting existing statute law. In the particular instance we did not have occasion to test our theories since in the 1937 revision of the Banking Law the exception in favour of the Port Authority was explicitly written into the statute⁴⁸

So much for our general problems. I would like now to refer to some of our specific problems.

I have already adverted to the question of immunity from suit. That problem is especially interesting because of the evolution of thought which has taken place within our own Authority. When the problem first arose in our own Department, I was of the opinion that since the Port Authority is a body corporate and politic, it was subject to suit just as if it had been an ordinary private corporation. In fact, you will recall that the Supreme Court has held that certain corporations created by the Federal Government under the State Stock Corporation Laws were, because they were incorporated under those laws, subject to suit.⁴⁹

And so, for many years we operated upon the theory that the agency was subject to suit. Then an interesting event occurred. In a contract action in the Municipal Court, we were called upon by the then sitting Municipal Court Justice⁵⁰ to supply him with a memorandum citing precedents for the proposition that the defendant Port Authority is subject to suit. Although we approached the problem with the feeling that we were so suable,

the cases as they opened up before us soon compelled us to change our position. It became clear that the suability or immunity could not be resolved merely by looking to the corporate form of the agency. The cases make it clear that the problem could only be solved by deciding whether the legislature intended to deprive the agency of such attributes as would withdraw the cloak of immunity.

The Treaty creating the Port Authority, we know, is silent on the question of suability. And since the Port Authority is clearly an arm of the two states the Courts have now uniformly found that the omission of an express provision for suability is controlling. The Port Authority has, therefore, been held immune from suit.⁵¹

Another field in which similar questions have been raised has been in the question of Federal and State relationships. We have constantly been faced with questions where we had to decide whether the Port Authority is to be considered an arm of the State in dealing with the Federal Government. You have heard a great deal of discussion on the question of the immunity of the income from Port Authority securities from federal income tax.

Two questions are raised in connection with tax immunity which are largely independent of each other. In the first place, Congress has expressly exempted the income from securities of a political sub-division of a state.⁵² In the second place, there is the constitutional immunity which prohibits the Federal Government from burdening the agencies of state government.⁵³ You will see that we are confronted thus with the question, first, whether the Port Authority is a political sub-division of the States of New York and New Jersey within the meaning of the revenue act. As to this I need only point out that Port Authority bonds have always been issued as being exempt from federal income taxes and the Bureau of Internal Revenue has always, in the past and to this very day, recognised them as being exempt. The second question is whether the Port Authority is an agency of the state within the purpose of reciprocal immunity of government obligations. Here too I have no doubt, and Attorney General Bennett joins me in the conclusion, that the income from Port Authority bonds is constitutionally immune from federal income tax.⁵⁴

Tax exemption in the intra-state field has been a fruitful source of problems to us. I need not tell you that we are living in a day when the inventive mind of the legislator is devising new forms of taxes almost from day to day. In the field of real estate taxation alone, the Port Authority is constantly confronted with the efforts of various municipalities in the Port District to levy a tax tribute on the state projects which we are now operating. In New York, as I have said, the tax law expressly exempts property of the state and property of a municipal corporation held for a public purpose. Attempts to tax Port Authority property have generally been based upon the claim that the Port Authority is something different from the state, and that its property is not the property of a municipal corporation which has been exempted by the tax law. However, the Courts have consistently held that the nature of the Port Authority as a state agency and as a municipal corporate instrumentality of two states warrants the construction that the tax law exemptions apply to taxation of Port Authority property.⁵⁵

Of course, we have had to recognise as a practical matter that the loss of tax ratables by municipalities within the Port District may make municipal administration more difficult. However, the equities of state-wide projects versus municipal administration must be balanced in the public interest. Accordingly, we have co-operated in securing legislation⁵⁶ in both states under which we are authorised to pay the municipality, in the cases of inland and marine terminal property, in lieu of taxes an amount not in excess of that which it received on the property before it was acquired by the Port Authority for state purposes.

I have not discussed as yet still other problems which we face in the Port Authority because we are the agency of two states—not merely of one. You will easily see that our problems are more complex by reason of that circumstance. We have had to fit ourselves into the framework of the law of two states. Of course, to the extent that the law of the two states coincides, the problem of bi-state creation is easily met. However, problems do arise where each state has taken a different viewpoint upon the question of law with regard to its internal administration. In that situation the United States Supreme Court⁵⁷ has indicated that the interpretation of interstate compacts and the laws with regard to agencies created thereby is to be treated as a matter of international rather than intra-state law.

In other words, legal questions arising with regard to such an interstate agency as the Port Authority are not to be solved merely as a matter of local law by the courts of either state. You have seen that one of the reasons for establishing the Port Authority was to set up a unified control which would resolve any conflict between the two states in matters of port and harbour development, yet leave the municipalities relatively free

Evolution of the Port Authority Plan in American Administrative Law—continued

in solving their internal affairs. A single agency unifying viewpoints of both states was the greatest step forward in avoiding the bitter rivalries which had threatened to disrupt the port. But we would not be free to effectuate that purpose if the local interpretations of local laws should apply regardless of its effect upon the pledge of mutual co-operation which the two states solemnly made in the Compact. For that reason alone, we have sought, and thus far successfully, to secure those broad interpretations rather than limitations upon Port Authority legislation.

Conclusion

On April twenty-first next, the Port Authority will have served the States of New Jersey and New York for nineteen years. Since that time the Authority idea has grown from a modest beginning in a single bi-state Port Authority to the point where there are now not less than thirty Authorities in New York State alone. Indeed, only a short time ago there were ten public Authorities within the metropolitan area of New York City,⁵⁸ and I believe it may fairly be said in the language of the New York State Constitutional Convention Committee of 1938⁵⁹ so successful has become its [the Port Authority's] work in the construction and operation of terminal and transportation of facilities within the port district that a pattern was set in this state and in other states."

But now that we have witnessed a rapid growth—indeed some have even called it a too rapid growth—of Authorities you, as experts and students of administrative law will doubtless want to pause and appraise their value, and possibly make prognostications as to their future development, as new forms of governmental units in American governmental life. Since, however you are the experts and students in administrative law, I leave that problem to you. I merely suggest that you keep several considerations in mind, although these are not the only ones to be taken into account. I suggest that in considering whether an Authority should be created in preference to the direct handling of the project by the federal, state or municipal government creator there be kept in mind the following considerations:

First, is it desirable to carry on the project as a self-liquidating government service to be financed without the credit of the creator federal government, state or city, and thus relieve the general taxpayers of some of their present onerous burdens. (Of course sometimes there may even have to be provided subsidies from the governmental creator in order to facilitate the accomplishment of the result.)?

Secondly, are there advantages to be found in the separate and independent operation of the project greater than would be found if the governmental creator handled the matter in some other way?

Obviously, the experience of The Port of New York Authority and of the Palisades Park Commission, shows that in the case of co-operation between two or more sovereignties the Authority method may prove to be the only practicable method.

Unless these, or other important and special considerations are present, in the case of any proposed Authority, I am of opinion that serious consideration should be given to whether the problem might not be better solved by some other form of governmental unit, or enterprise.

Not long ago an associate of mine addressed a group of municipal officials in a mid-western city. The topic, of course was one dealing with the Port Authority. After he had finished speaking, a fiscal officer of one of the towns hurried over to him and said:

"Mr. Speaker, what you just said about the Port Authority hits the nail on the head in my town. You know," he continued, "we have been wanting to build a playground in my city and the taxpayers have opposed it because they don't want to spend any more money and raise taxes."

"But I told the Mayor," he continued, "why don't we have a Playground Authority? The taxpayers have heard all about the wonders of Tennessee Valley Authority, and even of The Port of New York Authority, and if we just call this project the Playground Authority, the taxpayers will fall for it like a tons of bricks."

Apocryphal as that story may sound, it is true. And there, in my opinion, lies the danger of the Authority idea—a failure to understand its use as an instrumentality of constructing governmental projects upon a self-liquidating basis. Personally, I believe that if the Authority idea is confined to such projects it is sound. At least, it is as sound as the business venture upon which it is built, and the management under which it operates.

And now, finally, I should like to conclude by referring briefly to the two major constitutional problems which have now been pretty well settled.

Does the creation of an Authority to carry on functions which are intimately connected with the health and welfare of the people of the entire state violate, or conflict with, city home rule? The Court of Appeals has held that the work of the Buffalo Sewer Authority is in substantial degree the work, or

concern, of the state and the legislation creating the Authority was held not to conflict with the city home rule.⁶⁰

The second constitutional problem goes to the very heart of Authority financing. Does the vesting of power in an Authority to issue bonds and so create a debt violate constitutional debt limitations imposed upon various localities? Authorities, as we know them, issue their own obligations. The debt created thereby is entirely their own and the repayment thereof is confined to tolls and revenues. It seems clear, therefore, on principle, that the debt of an Authority cannot be confused with the debt of the state or city creating the Authority. Indeed, this has been the attitude of our Court of Appeals in the case involving the Buffalo Sewer Authority. Addressing itself to this point, the Court said:⁶¹

"There is here no question as to the bonded indebtedness of the 'properties' of the city. If, by any construction, the effect of the act would be to increase the bonded indebtedness of the city beyond the debt limit, a question might be presented requiring our consideration. The act, by Section 6 thereof, specifies that the bonds and other obligations of the Authority shall not be a debt of the State or the city and makes them payable only out of the funds of the Authority. Those funds the Authority must obtain, if at all, through loans, bond issues and sewer rents to be collected as herein-before mentioned. Bonds issued by the Sewer Authority are not protected by a lien upon the lands or properties * * *. The sewer rents provide the only means of revenues."

So much for the major constitutional problems. In the careful study of Authorities made at the New York Constitutional Convention, by the sub-Committee on Home Rule and Local Government, the Committee concluded that:

"* * * it is well to consider the underlying possibilities of authorities and their place in the future governmental scheme. They bring sharply to the fore two types of problems, the one closely related to the whole fabric of democracy, the other connected with important administrative and organisational consideration."

In the opinion of the Committee, the first problem—and if I may interpolate it is a problem of state policy—dealt with popular responsibility. The Committee drew the distinction between ordinary elected officials who are responsible to the electorate and appointed administrative officials charged with the administration of an Authority, and said:

"The question which must be decided is whether or not the authority is dangerous, and if dangerous, whether it is to be prohibited or continued perhaps with certain restrictions."

Here again I leave the consideration of the problem to you experts and students. I need only point out in the case of The Port of New York Authority that I believe no such problem exists. Under our legislative mandate, and as a matter of practice, the Port Authority Commissioners are in close touch with the Governors of both states as well as the Legislatures. Hence, while it is true that our Commissioners are not immediately responsible to the electorate, they are in effect just as responsible as if they were elected, through their continuous and direct relationship with the two Governors and the Legislatures of both states.

The second problem which the Constitutional Convention Committee mentioned very briefly was whether the creation of Authorities did not complicate an already complicated administrative scene. The answer in the case of the Port Authority—and I shall go no further in the discussion of the matter—is clear. Because of the interstate character of our problem it was essential to create a new agency instead of attempting to delegate the same work to existing agencies in each of the two states.

And now on behalf of the Commissioners of The Port of New York Authority, and myself as General Counsel, I want to extend my cordial thanks to Dean Sommer, Professor Tooke and yourselves for this opportunity to discuss "Port Authority" with you.

⁵⁸Surveys to date indicate that there are between 4,000 and 5,000 trucks operating into the New York area every day.

⁵⁹Norfolk, Philadelphia, Boston, St. John and Halifax all have 1,000-ft. dry docks but no 1,000-ft. ships.

⁶⁰The Holland Tunnel was not constructed by the Port Authority although when it was turned over by the States for operation, the Port Authority issued Fifty Million Dollars of its Series E, New York-New Jersey Interstate Tunnel Bonds and remitted the proceeds thereof to the States to reimburse them for their construction costs.

⁶¹An excellent unbiased discussion of Port Authority financing appears in Fowler on Revenue Bonds, "supra," note 31, at pp. 23-27, 71-76, "et seq."

⁶²Chapter 5, Laws of New Jersey, 1931; Chapter 48, Laws of New York, 1931.

⁶³See "supra," n. 4.

⁶⁴Chapter 553, Laws of New York, 1931.

⁶⁵Section 3, sub-division 2, 3, 4 of the Tax Law.

⁶⁶Section 108 of the Banking Law (New York) prior to the 1937 revision.

⁶⁷§103 (b) of the Banking Law (New York).

Evolution of the Port Authority Plan in American Administrative Law—continued

⁴⁹"Sloan Shipyards Corporation v. U.S.S.B. Emergency Fleet Corps.", 258 U.S. 549; "U.S.S.B. Merchant Fleet Corporation v. Harwood, 281 U.S. 519 (1930).

⁵⁰Honourable David C. Lewis.

⁵¹"Le Beau Piping Corporation v. The Port of New York Authority, et al.", 170 Misc. 644, Supreme Court, New York County, 1938; "Pink, etc." v. The Port of New York Authority, et al.", Supreme Court, New York County, N.Y.L.J. February 3rd, 1938; "Voorhis, et al. v. The Port of New York Authority, et al.", 170 Misc. 908, City Court of the City of New York, 1938.

⁵²See 22 (b) 4 Revenue Act 1938.

⁵³"Pollock v. Farmers' Loan & Trust Co.", 157 U.S. 429 (1895).

⁵⁴Legal Opinion on Immunity of Port Authority Bonds and Revenues from Federal Income Taxation, dated May 31st, 1938, by Mr. Julius Henry Cohen; Opinion on Immunity from Federal Income Taxes of the Revenues and Bonds of The Port of New York Authority, dated June 24th, 1938, by Attorney General John J. Bennett, Jr.; Opinion of Mr. Charles Evans Hughes, dated November 10th, 1925. And see also, The Constitutional Immunity of State and Municipal Securities, A Legal Defense of the Continued Integrity of the Fiscal Powers of the States, by The Attorneys General of the States and Counsel for Certain of Their Municipal Sub-divisions; The Fiscal and Economic Aspects of the Taxation of Public Securities, by Harley L. Lutz.

⁵⁵"Bush Terminal Co. v. The City of New York" (decided by the Court of Appeals, March 5th, 1940), affirming 256 App. Div. 978, which in turn affirms 152 Misc. 144.

⁵⁶Chapter 553 of the Laws of New York, 1931; Chapter 69 of the Laws of New Jersey, 1931.

⁵⁷"Lessee of Marlatt v. Silk," 11 Pet. 1 at 22; "Massachusetts v. New York," 271 U.S. 65 at 87.

⁵⁸P. R. Nehemkis, Jr., "The Public Authority: Some Legal and Practical Aspects," 47 Yale Law Journal 14 (1937).

⁵⁹Problems Relating to Home Rule and Local Government, New York State Constitutional Convention Committee, 1938, Vol. XI.

⁶⁰"Robertson v. Zimmerman," 268 N.Y. 52, 196 N.E. 740 (1936).

⁶¹"Robertson v. Zimmerman, supra," n. 60 (at p. 62).

The Port of Chittagong

Excerpts from Administration Report for 1939-40

The result of the year's working as compared with that of the previous year is as follows:—

	1938-39.	1939-40.
	Rs.	Rs.
Income, General Account ...	7,33,243	8,94,724
Expenditure, General Account ...	6,29,099	6,48,225
Net Revenue ...	1,04,144	2,46,499

The surcharge of 12½% on River and Port Dues originally levied in September, 1933, continued in operation throughout the year, resulting in additional revenues of Rs. 78,228 and Rs. 11,571 respectively.

The following statement shows the tonnage of goods that passed through the Port during 1939-40, compared with that of the preceding year:—

	1938-39	1939-40
Imports		
Total Foreign Imports ...	65,737	76,326
Total Coasting Imports ...	229,602	377,884
Inland General Cargo ...	23,800	16,305
Total Imports ...	319,139	470,515
Exports		
Total Foreign Exports ...	80,923	71,828
Total Coasting Exports ...	34,611	26,312
Inland General Cargo ...	9,177	9,675
Total Exports ...	124,711	108,815
Grand Total Trade—1938/39—443,850 tons; 1939/40—578,330 tons.		

Shipping.—During the year under report 693 vessels of a registered net tonnage of 5,72,527 tons entered the Port as compared with 864 of a registered net tonnage of 5,57,971 tons in the previous year. The following table shows the different classes of vessels entering the Port during the two years under review:—

	No.	Registered net tonnage	No.	Registered net tonnage
1938-39			1939-40	
Ocean-going—				
Foreign ...	165	439,482	186	480,760
Coasting ...	12	32,177	14	40,338
Inland steamers	584	80,400	385	47,180
Country vessels	103	5,912	108	4,249
Total ...	864	557,971	693	572,527

The temporary deterioration in river conditions last August, in abnormal circumstances, resulted in Government sanction to the final improvement scheme at Gupta Crossing, and it is pleasing to record that sufficient progress on the work was maintained as to indicate improved conditions for the 1940 rainy season. The up-river conditions still give rise to grave anxiety and it seems essential that stabilising works be carried out as early as possible.

Bombay Port Trust

Excerpts from Administration Report for 1939-40

Finance.—The original estimate of the income of the Port for the financial year 1939-40, on General Account was Rs. 230.04 lakhs. This was increased to Rs. 236.46 lakhs in the revised estimates owing to the expansion of the volume of imports and exports which then became apparent. During the remaining three months the expansion continued with the result that the income actually earned amounted to Rs. 242.46 lakhs.

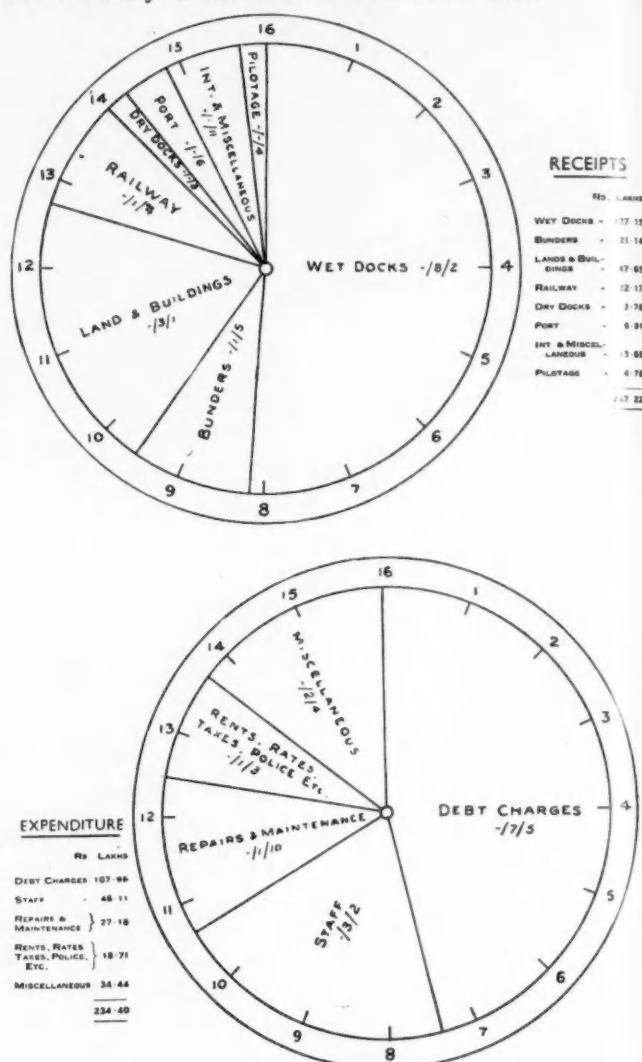


Diagram showing the distribution of each Rupee of Revenue and Expenditure in the Port of Bombay in 1939-40.

The original expenditure estimate of Rs. 229.27 lakhs was raised to Rs. 234.01 lakhs in the revised estimates to provide for the expansion of trade and increase in taxation due to the levy of the Urban Immoveable Property Tax. The actual expenditure during the year, however, amounted to Rs. 230.38 lakhs, an increase of only Rs. 1.11 lakhs on the original estimate and a saving of Rs. 3.63 lakhs on the revised estimate. The ratio of working expenses to revenue was 51.14 per cent. as against 51.95 per cent. in the previous year, a decrease of 0.81 per cent. The year thus closed with a surplus of Rs. 12.08 lakhs which has been transferred to the Revenue Reserve Fund. The Pilotage Account also closed with a surplus of Rs. 0.75 lakh which has been transferred to the Vessels' Replacement Fund.

Trade.—The cargo handled at the docks and bunders amounted to 5,325,000 tons, an increase of 229,000 tons as compared with the previous year. Imports accounted for about 63 per cent. and exports 37 per cent. of the total tonnage. The increase in tonnage was equivalent to 4.5 per cent.

Trade and Traffic Statistics.—The value of the trade of the Port as shown in the Customs returns, exclusive of Government transactions, was Rs. 138 crores, as compared with 145 crores in the previous year, a decrease of about 5 per cent.

Dry Docks.—The dry docks were occupied during the year by 173 vessels as against 167 vessels in 1938-39. The total tonnage was 781,317, being 172,887 tons more than in the previous year.

Dredging.—The total quantity of revenue dredging during the year was 69,142,200 cubic feet as against 64,254,700 cubic feet in 1938-39. The average cost on maintenance dredging was 11.7 annas per 100 cubic feet as against 12.9 annas in the preceding year.

Co-ordination in Port Operation

Appointment of Regional Port Directors

The announcement is made by the Ministry of Transport that in order to obtain greater co-ordination in the part of the national war effort that is centred on ports in the United Kingdom, the Minister of Transport (Colonel Moore-Brabazon) has appointed Mr. J. Gibson Jarvie and Mr. Robert Letch to be Regional Port Directors for the North-Western Region and the Clyde Region, respectively.

Their aim will be to secure: (1) most rapid clearance through ports of goods, whether inward or outward bound; (2) quickest turn-round of ships; and (3) best utilisation of available transport facilities.

The North-Western Region comprises all ports between Holyhead and Silloth; the Clyde Region, all ports between Stranraer and Oban.

The Regional Port Directors are to exercise the powers hitherto reserved to the Minister of issuing instructions for regulating and expediting traffic. They have already entered upon their duties.

Mr. Letch is assistant general manager of the Port of London Authority; Mr. Jarvie is the chairman of the United Dominions Trust, Limited.

Proposed New Dock Bridge at Calcutta

Kidderpore Dock No. 1 at Calcutta possesses two entrances from an outer Tidal Basin, lying side by side, one 80-ft. wide and the other 60-ft. wide, with an intermediate island which supports the pivot of a double-arm swing bridge spanning the two waterways. Traffic developments in this area and the increment due to the opening of the King George's Dock have rendered it desirable that a wider bridge should be provided. Accordingly the Port Commissioners are considering the replacement of the present bridge, which has a total road and side path width of about 24-ft., inclusive of a rail track, by a new structure with a 40-ft. roadway, a 15-ft. footway and an independent rail track. It is also proposed to increase the clear headroom above water level. Under present conditions, the bridge has to be swung for the passage of small craft and lighters as well as for large vessels. By increasing the headroom to 15-ft. 6-in., the smaller class of craft would be able to pass under the bridge, except when the railway platform is lowered for the passage of trains.

Another point under consideration is that of suppressing the narrower waterway. A double entrance is an undoubted convenience, but an experiment carried on during a period of 2½ months has shown the use of the wider waterway alone to be adequate for all present purposes. If the 60-ft. entrance were dispensed with and filled in, the cost of a new bridge would be very materially reduced. Provisional estimates which have been made assign a cost of 19 lakhs of rupees to the double-arm bridge and of 13½ lakhs to the single span (80-ft.) bridge, and it is felt that the additional outlay is hardly justified by the circumstances.

A further point under consideration is the type of bridge to be erected and the relative merits of the Scherzer lift bridge and of the ordinary road level swing bridge are being discussed. Meanwhile, provision has been made in the current year's capital budget for an initial expenditure of 6½ lakhs on the project during the twelve months.

New Inland Water Port Terminal in the U.S.A.

There has recently been inaugurated at Richmond, Virginia, U.S.A., a new port terminal on the James River for the service of deep draught vessels. Constructed at a cost of \$2,500,000, it is the last item in the programme of river improvements on which over six million dollars has been spent. There is now a channel 25-ft. deep from the sea to the Port of Richmond, terminating in a turning basin which is utilisable by ships of 650-ft. length.

The new terminal, located just under four miles downstream from the corporate limits of Richmond, is linked with the city by a 120-ft. State highway. The port has a 1,250 linear feet concrete wharf wall, eight miles of rail connections and yard tracks, two large fireproof warehouses with approximately five acres of storage space under roof, connecting highways and adequate freight handling equipment, including an electric crane of large capacity and two Diesel-electric switching engines. The deep-water terminal is to be privately operated by Richmond Waterfront Terminals, Inc., operator of the city's intermediate terminals in the upper harbour.

This addition to the shipping accommodation and facilities of the Virginian port will bring it into line with the leading inland ports of the United States.

The inaugural ceremony which was attended by Federal State and City officials took place on October 16th.

Correspondence

Timber versus Reinforced Concrete for Jetties and Wharves

[The following communication from the Contributor of the article was received after the publication of the January issue].

15th January, 1941.

In reply to the criticisms of Mr. Barnes which appear in the January number of *The Dock and Harbour Authority*, the writer of the article would like to state that he is not aware of having any prejudice or bias in favour of timber, but on the contrary, is a strong advocate of the use of reinforced concrete where such use is indicated as effecting an economy in capital expenditure or in the cost of maintenance, or being better suited for the particular purpose. It is the facts of the case that provide the bias in favour of timber in the design of jetties.

Mr. Barnes is correct in stating: "your Contributor's arguments regarding comparative strengths are based in the main on the assumption that the strength of a piled jetty depends on its resistance to bending stresses set up in the piles due to applied horizontal forces," and this is clearly set out in the original contribution, but he is apparently under the illusion that by introducing raking piles—itsself an admission of weakness—he can eliminate the basic fact that in the case of a jetty, a vessel coming alongside produces bending in the main structure, which timber, unlike reinforced concrete, can take up satisfactorily without "raking" piles, however advantageous the latter may be in both cases.

An admission appears to be made that timber is better in resistance to bending but that the reinforced concrete designer can remove that discrepancy by transferring such stresses into direct tension and compression and thus allowing reinforced concrete to assert its superiority, apparently overlooking the fact that bending itself is only a combination of direct tension, compression and shear, in all of which timber has a definite superiority. In deed, in addition, independent of this, the raking piles (especially in jetties giving deep draught) are subject to direct bending owing to the relation between the sectional area of the raking pile, say 14-in. by 14-in., and its length between supports, say 50 or 60-ft. In this case, owing to its weakness in bending, the "raking" pile is very little used as a strut, consequently it is an exaggeration to say that "bending stresses in the piles are secondary only and are very small compared to the horizontal forces." It is, however, correct to state that connections between raking piles and concrete deck can be made stronger and firmer than in the case of timber, but with timber such stiff connections are unnecessary.

It might be pointed out that in a timber jetty the advantage of the stiffness of a concrete deck is also available if it is considered desirable. In modern practice, it is quite the custom to put a reinforced concrete deck on a timber jetty, mainly for purposes of wear.

Obituary

Mr. Arthur Trevenen Coode, M.Inst.C.E., who died on 28th December, 1940, in his 65th year, was the eldest son of the late Mr. J. C. Coode, M.Inst.C.E., and grandson of Sir John Coode, K.C.M.G., Past-President of The Institution of Civil Engineers. He served his Engineering pupilage with the late Mr. J. Mansergh, under whom he was engaged upon important works in connection with the Birmingham water supply, and may be said to have commenced his practical professional career in 1903, as Assistant Engineer on the Folkestone Harbour Works, carried out for the South Eastern Railway Co., under the direction of Messrs. Coode, Son & Matthews, being subsequently engaged, for the same firm in conjunction with the late Mr. Hugh T. Ker, M.Inst.C.E., in investigating schemes for sewage outfall works at Plymouth, and for Harbours of Refuge in Devon and Cornwall.

In 1906 Mr. Coode became a partner in the firm (new Coode, Wilson, Vaughan-Lee and Gwyther) and was more specially responsible for their advice to the Crown Agents for the Colonies in connection with Harbours, Docks and River Works in many of the Colonies, more particularly in West Africa and in the West Indies. His professional duties entailed personal investigations in China, Malaya, West Africa, Trinidad and elsewhere. He was also immediately responsible on behalf of his firm for a very large amount of dredging plant supplied from time to time to various Colonial Governments through the Crown Agents for the Colonies.

In 1932 and 1934, he was the British representative on two International Committees of Engineers on missions to China in connections with Harbours, Docks, Rivers and Flood Relief Works. In 1924 he was appointed the British Representative on the International Technical Committee of the European Commission of the Danube, which appointment he held until 1938.

Mr. Coode was in the Royal Navy in the 1914-18 War, with the rank of Lieutenant-Commander when he served in the Mediterranean and at Archangel.

Madras Port Trust

Excerpts from the Administration Report for the Year ended 31st March, 1940

General.—There was an improvement in the volume of trade passing through the port during the year under review.

Value of Trade.—The value of the total trade of the Port of Madras on private account as furnished by the Collector of Customs, representing 39.87 per cent. of the aggregate trade of the Presidency as against 38 per cent. in the previous year, amounted to Rs. 2,252.64 lakhs or an increase of Rs. 289.89 lakhs as compared with the previous year. Imports accounted for Rs. 1,599.91 lakhs and exports Rs. 1,652.73 lakhs as against Rs. 1,631.62 lakhs and Rs. 1,331.13 lakhs respectively in the previous year. Foreign traffic (imports and exports combined) increased from Rs. 2,641.14 lakhs to Rs. 2,948.60 lakhs and coasting cargo decreased from Rs. 321.61 lakhs to Rs. 304.04 lakhs. These figures are exclusive of Government transactions.

Receipts.—Excluding the sum of Rs. 6,98,625 contributed from the Revenue Reserve Fund for the repayment in full of the balance of the loans from the Reserve Funds, the net revenue receipts for the year amounted to Rs. 38,88,783 as against Rs. 35,71,643 of the previous year. There was thus an increase in receipts of Rs. 3,17,140 over those of the previous year.

Excluding the net debit to suspense on account of the value of engineering stores on hand at the end of the year and the repayment of the balance of loans from the Reserve Funds, and excluding also the usual contribution to the Reserve Funds, the net expenditure for the year amounted to Rs. 29,79,960 as against Rs. 28,67,821 of the previous year.

Working Expenses.—Excluding from the gross expenditure contribution to the Reserve Funds which amounted to Rs. 2,23,200, interest on loans Rs. 7,61,994, repayment of debt Rs. 15,16,686, Sinking Fund Rs. 78,272, the net debit to suspense on account of the value of engineering stores held in stock Rs. 93,548 and the excess over 12 months' engineering expenditure Rs. 76,922, the actual working expenses came to 50.06 per cent. of the income as against 51.52 per cent. in the previous year.

Imports and Exports.—The total tonnage of imports and exports which passed through the harbour during the year under review was 1,287,606 or an increase of 12.1 per cent. on the previous year, the tonnage for the previous six years being 1,149,045 tons in 1933-39; 1,117,733 tons in 1937-38; 1,012,857 tons in 1936-37; 1,019,560 tons in 1935-36; 1,158,876 tons in 1934-35 and 1,009,192 tons in 1933-34.

Hydrographical Observations.—On comparing the contours of 1940 with those of 1939, it is noted that in 1940 the 10-ft. contour indicates a scour south of the sand screen, and the 20-ft. contour has made a definite advance northwards between the East Quay and the Outer Arm. The 30-ft. contour of 1940 indicates a little movement near the Aga Light indicating a scour in that area.

Shipping.—The number of vessels that entered the harbour during 1939-40 was 724 against 730 in the previous year and the total tonnage decreased from 2,681,606 to 2,571,738. The average tonnage of each steamer or motor vessel decreased from 3,783.65 to 3,610.15 registered tons.

Storms.—During 1939-40 there were three storms, none of them severe. The first and the second interfered with pilotage to a small extent. During the third storm the port experienced heavy seas and all quay berths were untenable. Some of the springs and fenders were lost or were damaged by this storm and a pilot cutter and three barges also sustained some damage.

Developments at the Port of Melbourne

It is announced that the Melbourne Harbour Trust are about to undertake an important channel approach improvement at the port, involving the dredging of a new channel, three miles in length with a depth of 40-ft. at low water, at an estimated cost of £400,000. The present channel will eventually be more or less abandoned, though it will continue in use for the next three years pending completion of the new channel. The object of the new scheme is to enable the largest liners afloat to berth at Station Pier or Prince's Pier under favourable conditions at high water, provided they can pass through the Rip.

Mr. A. D. Mackenzie, chairman of the Commissioners, stated recently that the function of a great port should be to induce trade to come to it by its convenience of navigation and general workability. The fact that some vessels were unable to visit Melbourne at all stages of tide and others were unable to enter at all compelled a review of the situation. The Commissioners had decided that to meet the position, dredging should be carried down to a low water depth of 40-ft., which was the limiting depth in Sydney.

To dredge to the depth proposed, Mr. Mackenzie said it was more economical to abandon the greater part of the present Port

Melbourne Channel and provide a fresh channel on a new alignment and location. This would have a total length of only three miles, compared with a projected length of five miles on the present alignment to obtain the necessary depth.

The Commissioners proposed to acquire further dredging plant to supplement their present fleet of seven dredges and eleven hopper barges, including a ladder dredge capable of dredging to at least 42-ft. at low water. Because of the shorter channel maintenance costs would be reduced by more than 50 per cent. A decision on the exact location should be made within the next two months.

The chairman also mentioned that work on the Appleton Dock scheme was progressing favourably and was well up to schedule. He added that there was no difficulty on the building side because of the war, as little material was required in the construction.

The present work is the result of a scheme drawn up some years ago and shelved during the depression. It will meet the need for extra wharfage space for large vessels. The whole scheme will cost about £3,500,000 and will provide berthage for 21 ships.

River St. Lawrence Ship Canal

Excerpt from Report of Chief Engineer to Canadian Minister of Transport

The following is the annual report of the operations of the River St. Lawrence Ship Channel Branch during the year ended March 31st, 1940:—

The various activities connected with the construction, maintenance and operation of the national work known as the River St. Lawrence Ship Channel were continued throughout the season of 1939, in the same manner and with the same staff and equipment as during the previous season. Again, these operations were chiefly concerned with the 35-ft. Improvement Project, under a 5-year contract which began in 1937. In view of the nature and extent of the work, progress to date has been quite satisfactory.

The dredging season began May 3rd and closed December 12th, during which time a total of 12 dredges of various types were employed for varying periods, for a total of 1,509 nominal working days; 4,716,516 cubic yards of all classes of material were removed.

Maintenance work under contract was also carried out in those sections of the previously dredged channel where sand filling had occurred. The remains of an old wreck were removed from the edge of the channel in Lake St. Peter; and the removal of the concrete base of the original low light, which had slipped into the channel at No. 3 Curve, was well advanced.

In the cleaning of the original 35-ft. channel, departmental dredging was continued. The department's stone lifter removed 607 boulders during the season. The operation of this useful unit is dependent on the amount of time that the survey steamers can be spared from their regular work.

In Montreal Harbour maintenance work was undertaken to clean up the dredged areas at Fairchild's Airport and at Pointe aux Trembles Wharf; a clam-shell derrick belonging to the National Harbours Board was used for this purpose.

The usual sweeping or sounding operations were carried out, consisting of reconnaissance sweeping in all dredged sections of the channel early in the season, followed by close sweeping of those sections where sand filling, boulders or other obstructions were indicated. A new steel sounding scow was placed in successful operation, replacing the last of the former wooden type. The increase in dredged channel area of recent years together with the demand for increased depth has now reached the point where more serious attention must be given to the question of maintenance. The available depth in the Ship Channel at low water remains at 32½-ft., except in the South Channel below Quebec, where in the St. Thomas and Beaujeu Channels the limiting depth at low tide is 26-ft. as shown by the semaphore at Crane Island wharf. Seventy-four per cent. of ocean shipping in the St. Lawrence River utilised the North Channel along the south-east side of the Island of Orleans in preference to the older South Channel.

During the season the operations of the Ship Channel Branch were extended to include the dredged channel of the upper Saguenay River leading to Chicoutimi. This channel approximately 9 miles in length and of a minimum width of 250-ft. was formerly dredged to 20-ft. at low water. A preliminary investigation of this channel was made and extensive filling was indicated so that the available depth was reduced to 14-ft., until a more complete investigation may be undertaken. A new triangulation survey and large scale plan of the area was completed for this purpose.

J. A. ST. LAURENT,
Chief Engineer.

Extracted from Annual Report of the Canadian Department of Transport for the Fiscal Year from April 1st, 1939 to March 31st, 1940—Ottawa, 1940. Price 50 cents.